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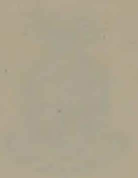

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXIII. 1 JANUARY, 1930. PART 1.

Event and Comment.

Service—A Thought for the New Year.

ACKNOWLEDGING the welcome received by him at a recent Rotarian gathering in Brisbane, His Excellency the Governor, Sir John Goodwin, remarked that in the course of the preceding ten days he had visited twelve or thirteen schools and, without realising it, had been preaching Rotarian doctrines. He had tried to impress upon the children that their work did not end with their life at school; their duty to the State then really only commenced. One word that must be borne in mind was the word "Service." That word expressed practically everything that was required in a State like this. A comparatively young country, it could not make progress without service from everyone. Every man and woman must be prepared to give of his best. It was simply splendid to see the amount of work that was done in the way of service. Everywhere he went he saw people giving up time and energy, and, where they could afford it, money. It was all service for the community. He could not tell how gratified and delighted he was to see it. There was nothing more contemptible than idleness, and there was no person more despicable than the man who lived for himself alone—who never gave a second's thought to service for the community or for his country. In travelling through Queensland one saw the Rotary movement flourishing in many places. There were many other organisations giving similar service, and inculcating into the minds of the people the best principles and the highest ideals. The Rotary Club, Toc H, Boy Scouts, Girl Guides, and many other organisations were doing splendid work. He always considered that, with such ideals in view, Queensland, a young country with tremendous resources, must have a happy and prosperous future.

Soil Surveys.

FROM an agricultural point of view, one of the most important measures considered in the course of the Parliamentary Session just closed was the Soil Survey Bill, introduced by the Minister of Agriculture and Stock, Hon. Harry F. Walker, and passed through all its stages. The new measure gives the right of entry by authorised persons on to private lands within the State for the purpose of carrying on soil surveys. Provision is also made for the payment of compensation in certain circumstances for any damage that may be sustained by the land owner in the course of any survey; probably this is a new departure, but it was considered advisable by the Government. The onus of proof of any damage rests, of course, with either the owner or the occupier. The Bill, which is regarded as long overdue, is necessary not only for the purpose of investigating matters relating to plant life in agricultural areas, but for the purposes of stock research, particularly in pastoral districts. It is of the greatest importance, for instance, that the fullest possible knowledge should be obtained of the chemical and other characteristics of our natural grasses and edible shrubs, if we are to make the most of and do the best for our live stock industries. Our soil research work to date has been very limited, but the work that has been done has already proved of immense economic value, especially in some sugar districts where certain soil deficiencies demonstrated by survey and analysis were subsequently corrected with very satisfactory crop results. The main purpose of the new legislation is to make an inventory of Queensland soils, and this will be most valuable to the new settler and the man already on the land.

Tobacco Land in the North.

SPEAKING on the second reading of the Soil Survey Bill, the Minister in charge of it, Mr. Walker, referring to valuable investigations already made in the sugar and cotton belts, said that quite recently many analyses of Northern soils had been made with a view to ascertaining their suitability for tobacco growing. From the data obtained it could be shown that tobacco could be grown in North Queensland equal to that produced in any other portion of the Commonwealth. Other facts revealed by an effective soil survey, which had been necessarily limited territorially, added Mr. Walker, went to strengthen the case for the extension of tobacco growing in Queensland and, incidentally, showed what great benefits will follow a systematic soil study throughout the State.

The Cotton Industry.

PLANS for establishing the cotton industry more firmly in Queensland were announced by the Minister, Mr. Harry F. Walker, recently, and these include the active encouragement of the establishment of cotton manufactures within the State. In the course of his statement, Mr. Walker said that it was noteworthy that if the cotton manufacturing industries throughout the Commonwealth were developed to an extent comparable with Canada, and having regard to the difference in population, we would be growing and manufacturing in Australia close upon 200,000 bales of cotton, worth £10,000,000 per annum, whereas last year's production was 5,000 bales, worth only a few thousand pounds sterling. It was considered that a sixfold increase of production in Queensland would be attainable within a short term of years on existing lands with a continuous progressive increase. The average yield per acre in Queensland was slightly in excess of the average yield per acre in the United States, while the quality of Queensland cotton was, on the average, at least 100 points above American middling.

When a commencement was made upon the establishment of the industry at the beginning of the decade just ended, it was thought that the industry would be engaged in only as a side line by mixed farmers on small acreages. While this might probably always be so to some extent, the experience of the past three years had led to the view that specialising in the production of cotton seemed to be more profitable to the farmer, and more economical in production cost than the engaging in it as a side line with other crops. The most successful cotton growers were those who had concentrated on the growing of cotton on large acreages.

With respect to marketing, the chief item of cost in Queensland has been that of ginning, which was at least double that ruling in America. Plans for the cheapening of ginning costs for Queensland growers had been formulated. The taking of action had been suspended, pending a determination by the Commonwealth authorities respecting the duties, and now that the Commonwealth policy had been announced the matter would be brought to a head. The question of the establishment of co-operative ginneries also was about to be considered, as well as other matters relating to the stabilisation and further development of cotton growing and manufacture within the State.

Committee of Direction of Fruit Marketing.

EMPHATIC endorsement of the principle of co-operative selling has been given by the fruitgrowers of Queensland. On being asked to decide by postal ballot whether the operation of the Fruit Marketing Organisation Act, and therefore of the Committee of Direction, should be continued for a further five years, they recorded an overwhelming affirmative vote. Expressing his satisfaction at the result, the Minister, Mr. Walker, said that organised marketing was the only system under which farmers could successfully compete in, or against, the commercial world. The actual figures were—For continuance, 3,240; against, 476; informal, 32; majority for continuance, 2,764. As only a simple majority was required to give effect to the proposal, the Act will continue in operation. Altogether 5,332 ballot-papers were issued to fruitgrowers all over the State, and 3,748 were returned. This constituted a 70 per cent. poll, of which 87 per cent. was in the affirmative.

Dairying—The Best Season for Years.

DISCUSSING conditions in the dairying industry, the Under Secretary, Mr. Graham, says in his Annual Report that it is pleasing to record that the dairying industry had the best season for years. In the dairying areas conditions were generally favourable for high production. Early spring rains ensured good pasturage until the beginning of the wet season in mid summer. With grass and fodder in ample supply there was no evidence of the usual decline of output in the autumn.

Butter production for the year reached the highest point yet recorded in Queensland, being nearly 5,000,000 lb. above the record for the previous peak period. This gratifying position is due very largely to a general improvement in dairy practice and factory processes. The modernisation of manufacturing plants was also a factor in this advance.

The past year was remarkable for the number of new factories that were built to replace old and obsolete plants and to meet the rapidly expanding requirements of the industry. In the Upper Burnett dairying developed to such an extent in the newly settled territory that a factory had to be built to cope with the heavy cream output. In all these establishments modern manufacturing units have been installed.

In the State there are now fifty-two butter factories, seventy-three cheese factories, and one condensed milk factory in operation. These are supplied from 22,500 dairy farms, which include those supplying, wholly or partially, the domestic milk market. The capital invested in the industry in Queensland approximates £35,000,000. The value of the output for the period under review was approximately £7,600,000.

There is still room for improvement, however, in the quality of cream. The general use of motor transport has provided for regular and quicker cream deliveries; but it has also helped to increase competition among manufacturers who by this means are able to draw supplies from localities far beyond the limits of their natural territorial zones. This bidding for cream often tends to encourage laxity in methods of production and other forms of inefficiency which the Department seeks assiduously to correct. As stressed in previous reports, unregulated cream cartage is wasteful and generally unsatisfactory; an efficient transport organisation is an essential service to the modern butter factory.

Systematic instruction in the science and practice of dairying and regular inspection of dairies, which covered also the inculcation of hygienic principles when necessary, engaged the attention of the field staff in the course of the year.

There was a general improvement in manufacturing methods, and this cause for satisfaction is due largely to the employment of technically trained and qualified staffs. There are, however, some practices in regard to cream grading and some technical faults in manufacture that call for consideration and correction if we are to increase the quantity of best-quality butter and attain and maintain generally the highest standards of dairy production. The total quantity of butter manufactured for the year was 74,386,663 lb., which constitutes a record for the State.

The value of systematic herd testing is now recognised more widely, and it is satisfactory to report the cordial co-operation of an ever-increasing number of dairy farmers with officers of the Department.

It is also recognised more generally that the provision of fodder reserves and improvement of pastures are essential to increased and regular production. Too much dependence on natural grasses and herbage without any supplementary rations exposes the industry to undue seasonal risks, as well as to economic loss due to irregularity of supply.

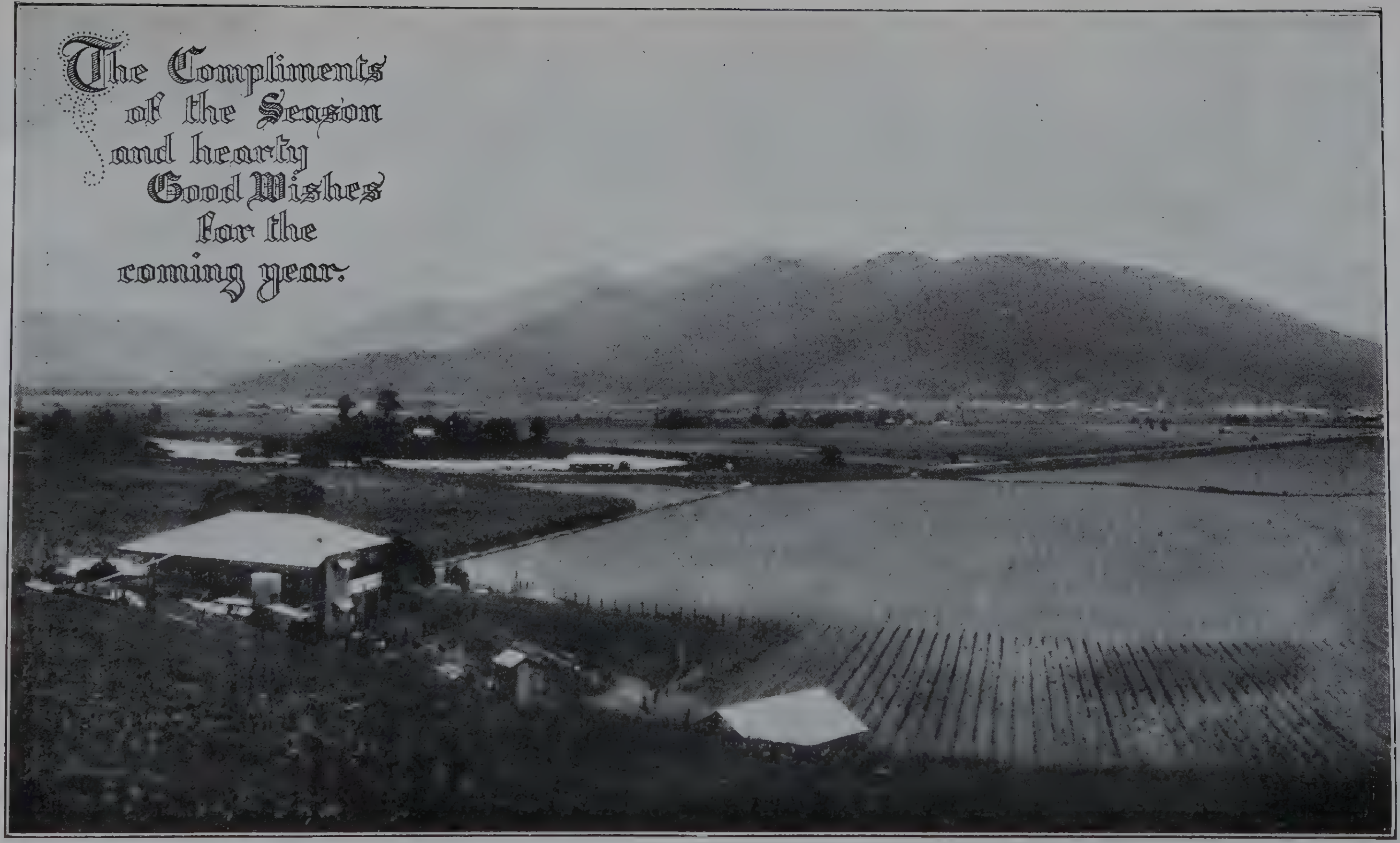
The Compliments
of the Season
and hearty
Good Wishes
for the
coming year.

Photo.: H. W. Mobsby, F.R.A.S.]

PLATE 1.

In the shade of Bartle Frere, the loftiest mountain in Queensland, nestles the flourishing town of Babinda, the centre of one of the richest regions on our far north coast, one of the most fertile provinces in the whole world. In the left centre is a beautiful bend of Babinda Creek, a tributary of the Russell River, bordered by well-tilled canefields, land that was formerly clothed luxuriantly in dense tropical jungle.

The Minister's New Year Message

To the Farmers of Queensland.

Department of Agriculture and Stock,
Brisbane, 31st December, 1929.

Optimism is an Australian characteristic, and why not! Though many new and perplexing problems confronted us during recent years, we have in a measure succeeded in settling some of them, while in respect to others of greater complexity we have advanced well along the road to their ultimate solution. With regard to many of them we have fortunately been able to erase old lines of cleavage, and to give of our best in healthy co-operation for the common good.

In respect of primary industry particularly, we are already bringing the advantages of scientific research to bear on questions of production, and are also applying them more widely in the field of distribution. Reduction of costs, the elimination of waste and the full utilisation of all our resources are regarded by most of us as essentials in the improvement of our economic life. We are coming to a better understanding of all these needs and, in the spirit of sweet reasonableness, we are rising above old and outworn distinctions. We are looking for the whole hearted co-operation of all concerned in doing the work of the country in all those things that call for vigorous and understanding effort along lines that will lead to social happiness and material prosperity.

Looking around on the world to-day and, notwithstanding all our present difficulties, which we do not discount and will not exaggerate, I know of no people more happily placed in a country more abundantly blessed.

At the beginning of another year and at the dawn of a new decade, with rapid and sound development in our primary industries; a corresponding expansion in our secondary enterprises and consequent extension of our home markets; and a deepening public appreciation of the call for social service we may look forward cheerfully and confidently to an early realisation of further benefits, added to those we now enjoy and which have given rise to the feeling of optimism that I have expressed.

I wish the producers of Queensland good seasons and good markets in the coming year and the years that are to follow; that prosperity will be brought to their homes and happiness to their families and that success will continue with them through a long and fruitful future.

Harry F. Walker

Secretary for Agriculture and Stock.

Bureau of Sugar Experiment Stations.

CANE PESTS AND DISEASES.

The following report (7th December, 1929) *from Mr. W. A. MacDougall, Assistant to the Entomologist at Meringa, has been received by the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—*

Short trips were made to mill areas—Babinda (12th and 13th November); Tully (14th and 15th November); and Goondi (21st November).

The Beetle Borer *(Rhabdocnemis obscurus* Boisd.).

The infestation at Tully is negligible. The very little present could not be eradicated by Tachinid flies; it would not support the parasites.

As previously reported (17th October, 1929), the Goondi area is under systematic control. A further sixty flies were liberated in borer-infested Badila on river flats across the river from Goondi Mill.

It was pointed out that a borer infested banana plants also. The insects taken from the banana corms were the banana borer (*Cosmopolites sordida* Chev.), which species has never been found in cane sticks.

Trucks of cane in the Babinda mill yard were inspected for borer damage. About 10 per cent. of the cane in the yard, at the time of inspection, showed the presence of borer on the farms on which it had been cut. Unfortunately, it was found that these farms hadn't standover; therefore Tachinid flies cannot be liberated on them at present. During the past four years numerous liberations have been made on one farm in this area. In the localities close to the liberations the borer damage is comparatively lighter than that of a few years ago. In one block 300 yards from any liberations, 5-feet Badila sticks were found to have been completely riddled by borers. In some other instances the damage was at the top only or was confined to the lower 1 or 2 feet. Twenty of the heavily infested sticks were cut open and examined. An average of ten grubs and cocoons per stick was estimated. Of these one to two per stick had been killed by flies (an average of three puparia to an infested grub). The farmer in question plants, as far as possible, "clean" seed. To help the flies with such heavy work, traps of split cane should be spread, particularly during March and April. These traps, placed amongst the seedlings at the Experiment Station, South Johnstone, have been the means of catching hundreds of adult borers.

Emergence of Beetles (*L. caudata* Blkb.).

At Babinda, 89 points of rain fell during the last week in August. This liberated *Lepidiota caudata* Blkb. There were a few strays about during the last few days of August, but the big flight was during the first week of September. From reports, the adult habits seem to be similar to those of adults of *L. frenchi* Blkb. The last of these beetles (*L. caudata* Blkb.) was seen on 8th October.

At Tully, near swampy land, there were numerous *Anoplognathus smaragdina* Ohaus, resting on *Acacia* sp. The grubs of this beetle have never been recorded as attacking cane.

At Goondi, small patches of Pompey and Badila have been checked by grubs of *Anoplognathus boisduvali* Boisd. (Christmas Beetle). The damage was not extensive, and probably the existing weather conditions were responsible for the showing up of damage which, under more moist conditions, would not have been noticeable. Again, under normal conditions, it is very probable that these grubs would not attack cane at all. After over an inch of rain the "greybacks" were flying in Goondi area on the 19th instant. Previous to this numerous "strays" had been picked up dead.

Army Worms and Moth Borers.

As usual there were outbreaks of army worms at Harvey's Creek and Bartle Frere. The damaged cane has recovered. The spraying, with lead arsenate, of the cane immediately in front of an advance of these caterpillars on a farm at Tully was successful in its purpose. The advance was checked.

On examination of the few "dead-hearts" found around Mirriwinni it was found that the moths had emerged.

At Tully, some "dirty," flooded H.Q. 426 was found to be badly infested by the large moth borer (*Phragmatiphila truncata* Walk.). The cane was anything up to 3 feet long, but had been attacked anywhere along its length. Plants could not be cut from it as it would be practically impossible to get them "clean."

Minor Pests.

One patch of young cane, at Tully, was being attacked by nymphs of a grasshopper (unidentified). These nymphs attacked "blady" grass also. A species of bag-moth (*psychidæ*) and an *Atractomorpha* sp. were noticed feeding on cane leaves. At Mirriwinni, *Aphidæ* (plant lice) were plentiful, and occasionally every leaf of a young plant would be infested.

Along the headlands or in the nearby scrub, the following insects, amongst others, were taken:—*Amenia imperialis* R.D. (Dexiid fly), *Aesernia australica* Jac. (leaf-eating beetle), *Theogonis australis* Fabr. (Coreid bug), and a series of *Stephanitis queenslandensis* Hacker (Tingitidæ).

Thanks are due to the field officers at Goondi and Tully mills for help given and information supplied.

ENTOMOLOGIST'S ADVICE TO CANEGROWERS.

Apparatus for Fumigating Cane Grubs.

During the last twelve months a decided advance has been made in the construction of mechanical apparatus for treating grub-infested cane land. The importance of such mode of application was first stressed by the present writer in the year 1924, when several attempts were made to induce the firm of Massey-Harris to build a suitable machine, or adapt one of their corn-planters for such useful work (see Bull. No. 19 of this Office, pp. 19, 20).

A few years later (1926) I discussed this matter with Messrs. Gelling Brothers, of Cairns, and persuaded them to undertake the construction; with the result that they have just succeeded in completing a machine for injecting liquid fumigants, which will, I understand, be used this coming season by some of our canegrowers.

There is still room for some farmer of an inventive turn of mind to hit upon some simple method of applying dry paradichlor. to grub-infested cane land; either by constructing a machine for burying uniform doses of this fumigant alongside the cane rows, or by adapting some fertilising machine for such purpose. It is probable that during the coming season two machines, at least, for applying liquid injections will be tried out in our canefields.

Examine the Soil for Grubs of Greyback Cockchafer.

In localities where a few inches of rain chanced to fall early in November, grubs of this pest will be found to be in the first instar or condition of development. This stage, which covers the time from hatching of the eggs to the first moult or change of skin, lasts from four to five weeks, and may be at once distinguished by a glance at the head, which never exceeds one-eighth of an inch in width.

This simple character, together with the presence on the middle of the lower surface of the last body segment of the grub, of two parallel rows of tiny bristles (easily seen with a pocket lens), indicates that the grub in question is that of our common "greyback" cockchafer.

Farmers Take Notice.

Growers seeking advice or applying for the liberation of tachinid parasites to be made amongst borer-infested cane, are asked to forward at the same time a sample of the insect believed to be causing the damage.

Moth-borer injury is frequently mistaken for that brought about by the "weevil borer" (*Rhabdocnemis obscurus* Boisd.) since both of these insects are found tunnelling in cane sticks. No less than six different insects attack shoots of young ratoon and plant cane, all of which are responsible for damage of very similar appearance—viz., death of the central or heart-leaves, known commonly as "dead-hearts."

When uncertain as to the name or habits of any insect discovered to be injuring cane (whether the roots, sticks, or leaves) the specimen should be dropped into a small bottle containing methylated spirits and water (half and half), and posted at once to the Entomologist at Meringa Experiment Station for identification and advice.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director, Bureau of Sugar Experiment Stations.

IN the following series of articles it is proposed to revise and bring up to date a Bulletin on the Sugar Industry, prepared by the writer some years ago. During the period that has elapsed the industry has developed to such a degree and the conditions have so altered that such a revision appears necessary. At the same time, it is recognised that the problem of the sugar industry in Queensland, which supplies some 96 per cent. of Australian-grown sugar, is so many-sided and is governed by so many factors, that it forms in itself a complicated study of no mean magnitude, and one which it is impossible to deal with completely in much less than a large volume. The industry has also during late years been closely bound up with politics, both Federal and State.

It is proposed to divide the subject under several heads, each of which will be dealt with as briefly as possible. These will include—

PART I.

- (*a*) Short history of the Queensland sugar industry prior to federation.
- (*b*) Review of the industry since federation.
- (*c*) Scientific work, varieties of cane, cultivation, soils, pests, milling work.
- (*d*) Comparison with other countries.
- (*e*) Labour and wages.
- (*f*) Health in the tropics.
- (*g*) Utilisation of by-products.
- (*h*) Present-day problems. Foreign settlement.
- (*i*) National importance of the industry and need for protection.
- (*j*) Expansion of the industry.

(a) Short History of the Industry Prior to Federation.

The cane-sugar industry in Queensland, like many others, commenced on an insignificant scale early in the history of the then colony.

It was stated in a report on the sugar industry made in 1880 by Mr. Henry Ling Roth, to whom I am indebted for many of the following details, that as far back as 1823 Mr. Thomas Scott, under the patronage of Sir Thomas Brisbane, succeeded in growing sugar-cane at Port Macquarie, in New South Wales, and manufacturing 70 tons of sugar. Mr. Scott worked hard, both practically and by ventilation of the subject in local newspapers, to prove that sugar could be manufactured in that colony. In 1849, proposals were made for the formation of a sugar company in South Brisbane, and there is said to have been a small plantation at Eagle Farm, on the Brisbane River, but apparently no sugar was made. Sugar-cane was cultivated in the gardens of several people in Brisbane about this time, and a considerable amount was also grown in the Government Botanic Gardens, for it has been stated that a patch of land was devoted to its cultivation; and here apparently the first definite effort was made to manufacture sugar in Queensland. This occurred at any rate some years before 1860; and if one may accept the evidence given by Mr. George Edmondstone, M.L.A., before a Select

Committee of the Legislative Assembly, the attempt was made by Thomas Bowden, "who was introduced by Dr. Lang for the purpose of commencing sugar-cane growing and manufacture of sugar, but he was not successful in the manufacture."

The first sugar produced in Queensland, according to Mr. Walter Hill, at one time in charge of the Botanic Gardens, Brisbane, was made as follows:—Sugar-cane was taken from the Botanic Gardens in December, 1859, and passed between two steel rollers. The juice was taken to Mr. Brooks's biscuit factory in Queen street, and about 6 lb. of sugar was made in a copper vessel. Others say this sugar was made at Mr. Fowles's bakery, next the Australian Hotel, in Queen street. In 1861, sugar-cane was exhibited at the first Queensland Exhibition, also a good quality of rum manufactured from same. The first sugar made in Queensland, however, of which there is any official record, was manufactured by Mr. John Buhot in 1862, and a committee consisting of Messrs. S. W. Griffith, Moreton, Buzacott, and Macrossan was subsequently appointed to inquire into certain claims made by Mr. Buhot. Its report was published in 1874; and from the report and the proceedings of the committee we get at any rate something definite. The committee found—

(*a*) That Mr. Buhot was the first person who actually made granulated sugar in Queensland from sugar-cane grown in the colony.

(*b*) That before 1862 (when Buhot succeeded in making such sugar) many persons had contemplated the possibility of growing sugar-cane to profit in the colony, but it was not ascertained whether sugar could actually be produced from such cane; and a recommendation was made that a free grant of 500 acres of land be made to Mr. Buhot as a reward.

In 1863, Captain Louis Hope had 20 acres under cane on Ormiston plantation, near Brisbane, and that gentleman is generally conceded to be the father of the Queensland industry. In recognition of his services to the State in that respect an Act in the Queensland Parliament was passed in which it was stated—"Whereas it is just and expedient that the important services of the Honourable Louis Hope in his endeavours to establish the production of sugar should be recognised . . . ." and then proceeded to authorise the Hon. Louis Hope "to select in one or two portions, the whole not exceeding 2,560 acres of land . . . . within 30 miles of the coast . . . . and to obtain a grant in fee simple of such land."

In 1863 the London Society of Arts offered a medal for the first ton of sugar made in the colony. The first sugar-cane plants were most probably imported from Java and Mauritius, and about this time the Queensland Acclimatisation Society took active steps in bringing over a large number of varieties. A tremendous impetus was given to the industry when land was made available for some years by the Government on remarkably easy terms for sugar growing, and in 1865 as much as 1,829 acres had been taken up. Shipments of cane plants were this year made to New South Wales farmers. Many people embarked on sugar-growing, who had no knowledge of the subject, but possessed a vague confidence that it would come out all right, and some even commenced planting cane on the Darling Downs in the most unlikely localities.

The early stages of the industry were almost entirely devoted to the production of cane and the extension of land under cultivation. In 1866 so great was the demand for plants that there was actually a scarcity of cane for planting.

By the end of 1867 there were nearly 2,000 acres under cane, and six mills had been erected which between them manufactured 168 tons of sugar. There was. however, an insufficiency of mills, which caused heavy losses to the famers, but it is stated that millowners did well, as they could buy cane for 4s. a ton.

However, by 1870 there was twenty-eight mills in operation and a number of others in course of erection. The principal cane districts were then the Albert and Logan, the Moreton Bay area, the Mary and Wide Bay, but the cultivation of cane now began to spread to Bundaberg, Mackay, the Herbert and Johnstone Rivers, and Cairns. It is in these places to-day that almost the entire output is manufactured, the extreme southern districts making very little.

The Hon. T. H. Fitzgerald and John Spiller are credited with having planted the first cane in Mackay, and the first mill in that district (Alexandra) was erected by Fitzgerald and Davidson in 1868. Shortly afterwards, the following mills were erected, viz.:—Pleystowe, Branscombe, Nebia, Dumbleton, Pioneer, Foulden, and Casada. According to statistics at the time there were 3,436 acres under cane in the Mackay district in 1872.

Sugar-growing continued to prosper, more land was brought under cultivation, and steam mills quickly superseded the antiquated cattle and horse power erections.

The following description of the work of an early sugar mill by Major A. J. Boyd is interesting:—

> "In the early days of sugar-growing in Queensland there was no such thing as the modern sugar mill. One form of mill consisted of three upright rollers, about 2 ft. high and 15 or 18 in. in diameter. Some of these rollers were driven by four horses walking round a circular horse path and harnessed to each end of a beam to which one of the rollers was attached. The work was very heavy, and at least eight horses were required for relief. The "battery" consisted of two oblong pans into which the juice from the rollers was led. There it was clarified by liming on attaining a heat of about 140 deg. F. From these clarifiers the juice was led by pipes to two lower pans called subsiders. There the scum was removed by large perforated ladles, and then the juice went to the first pan (the green pan of the battery). There were four large square pans, and one circular one called 'the tache.' In the first four the juice was frequently skimmed while boiling, a roaring fire being maintained in the furnace beneath them. On arrival at the tache, the juice was bucketed into it, and it was boiled until it bubbled like porridge. At this stage a circular bucket with a valve at the bottom was lowered into the tache and conveyed the contents to the wooden coolers, where it was left to granulate. This process was repeated as fast as the tache was refilled from the pans. Should the sugar-boiler not be careful to note the appearance of the concentrated juice when boiling in the tache, the result would be that instead of granulating, in the coolers, a sticky slimy mass would be produced which went by the name of 'sling,' without any granulated sugar.

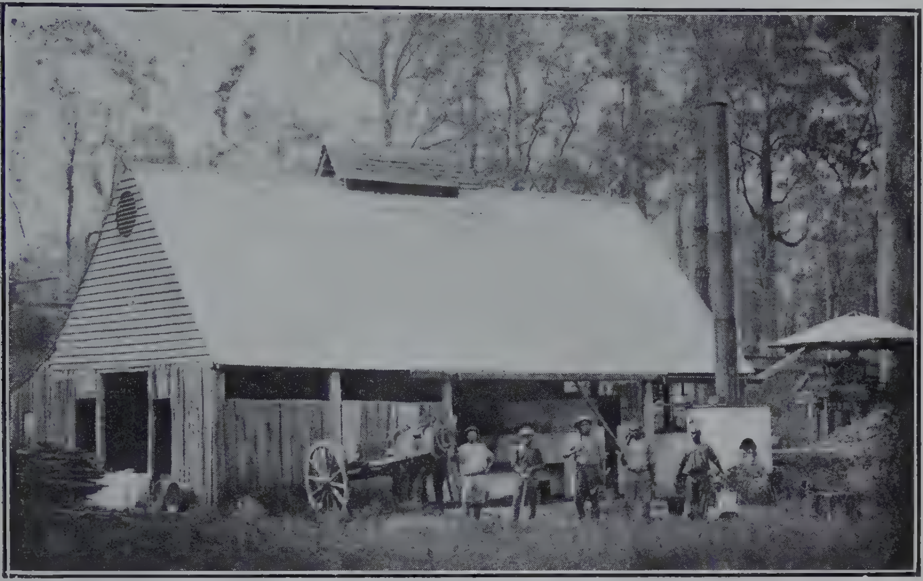

PLATE 2.
MAJOR A. J. BOYD'S SUGAR MILL AND BOILING HOUSE, "ORMEAU," PIMPAMA, 1869.

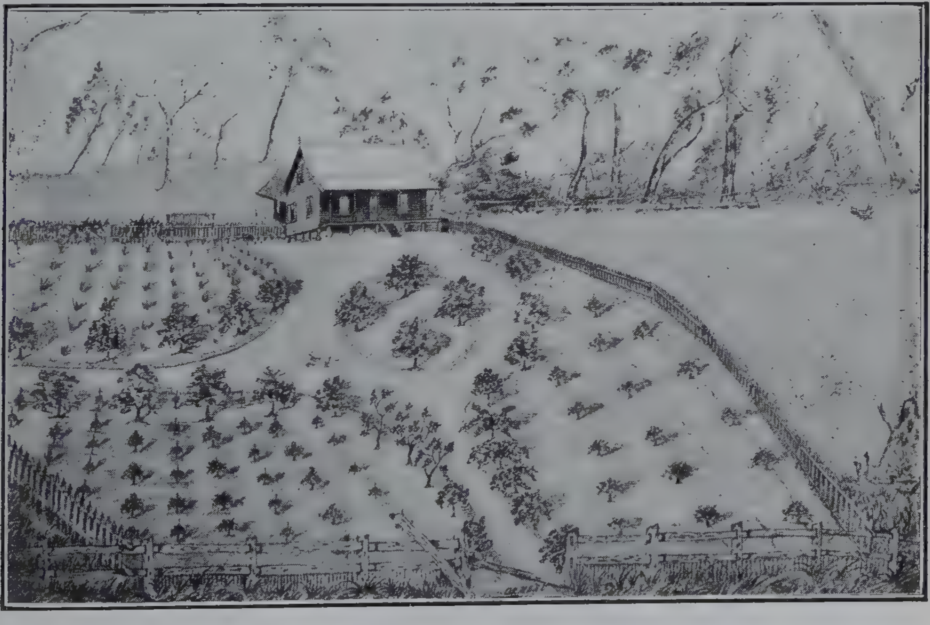

PLATE 3.
THE HOUSE AND GARDEN AND CANE NURSERY.

> "To give an idea of the amount of work which such a mill would do daily, the writer, who erected one on his plantation, 'Ormeau,' Pimpama, about the year 1869, was well pleased if 1,800 gallons of juice were obtained from a day's crushing. The average was about 800 gallons, and it took about 20 tons of cane to make 1 ton of sugar.
>
> "Some growers drained their sugar in wooden bins, the bottoms of which were perforated with numerous holes, into each one of which a stick of banana stalk was stuck. This was a terriby slow process, and the resulting sugar still held a certain amount of molasses, which in course of transit oozed through the mats in which the sugar was in those days marketed. One mill-owner, having read up the 'claying' of sugar in the West Indies, placed a layer of some kind of white clay on top of the sugar in the bins and freely watered it. To some extent, this watering washed away the molasses from the sugar, which then had a dull, gray appearance, but saleable at a slightly higher figure than the dark, brown 'Muscovado.' Later on centrifugals, Bauer-pans, and Wetzel pans were introduced, into which the steam passed through coils. Triple effets and vacuum pans had not then arrived. The cost of such a mill as I have described was about £200, and the crushing power was so weak that juice could be squeezed out of canes which had been passed through the rollers. And to conclude, how were the canes passed through? A man sat on the bedplate of the mill and fed the canes one by one. If three canes, or even two of extra thickness should attempt to pass together, the mill stopped. The number of hands required to work this primitive machine was a horse-driver, two cane carters, a sugar boiler, four men skimming the pans, one man at the final tache, one man working the crane, one fireman, one man at the subsiders, one man to feed the mill—a total of thirteen all told. When the centrifugals were installed in 1868 and an engine took the place of horses, two mechanics were needed."

It was soon ascertained that cane could only be cultivated profitably in areas that were at a small distance from the sea. "This distance differed in different localities, but 30 miles appeared to be the utmost limit, while the more tender canes seldom did well at a greater distance than 12 miles from the sea." It was also reported that frost was the most serious enemy which the canegrowers of Australia had yet encountered. During the winter of 1869 the cutting effects of frost laid low hundreds of acres of cane.

The industry at that period was almost entirely carried on by coloured labour introduced from the South Sea Islands. On 15th August, 1863, the "Don Juan" schooner arrived in Brisbane bringing about eighty Kanakas. This was the first recruiting vessel in the trade. As plantations increased this class of labour was brought over in larger numbers every year. In the absence of Government regulations, the traffic was greatly abused, and on 4th March, 1868, with, as it was said, nearly 1,000 Polynesians already in Queensland the first of several Acts passed by the Parliament of the colony dealing with this question received the Royal Assent. It was an Act intended to prevent abuses and to secure to the Polynesian labourers proper treatment and protection, as well as to secure to the employer the due fulfilment by the immigrant of his agreement.

Subsequent to 1868 in connection with the regulation of coloured labour, two Acts were passed by the Imperial Government between 1872 and 1875; eight by the Queensland Government from 1880 to 1913; and thirteen by the Commonwealth Government from 1901 to 1912.

The minimum rate of pay to Polynesian labour was about £6 per annum and food and clothing, the annual cost per head being about £27. The food allowed to Kanakas under the 1868 Act was bread or flour 1 lb., beef or mutton 1 lb. (or fish 2 lb.), 5 oz. of molasses or sugar, and 2 lb. of vegetables per day; 1½ oz. of tobacco, 2 oz. of salt, and 4 oz. of soap per week. The Kanakas generally arrived skinny and left in strong and healthy condition. When returned to their islands a good many came out again. There was considerable opposition, however, but an article in favour of black labour and its relation to Mackay stated that "were it not for sugar that town would in all probability consist of a couple of stores and a 'pub' or two, with a population of fifteen to twenty souls and the land in the hands of the squatters; but now, though small, it is one of the richest and most thriving towns in Queensland."

In 1875 a disease termed "rust" broke out in the cane. This, combined with an excessive rainfall, brought ruin to many sugar-growers, The financial institutions became alarmed, and refused to render further aid. Planters, however, were too energetic to let their estates go out of cultivation. The variety affected was known as the "Bourbon" cane, but it was noticed that small patches of "Rappoe" or "Rose Bamboo" were not touched. Those who survived the blow commenced the cultivation of this and other varieties, and confidence was soon restored, though many plantations changed hands.

Up to 1875 the varieties of cane grown were few, but subsequently large numbers were introduced. At this period it was stated that cane was bought by weight, and indeed it was so for a long time afterwards. The saccharometer was said to be used sometimes, but the polariscope was only known by hearsay. Vacuum pans were at that time coming into use in the mills, and the sugars were all centrifugalled in 1880.

During 1879 and 1880 a rush set in for Queensland sugar lands, and plenty of capital was made available. The production of sugar in 1870 and 1880 is given as follows:—1870—2,854 tons; 1880—15,681 tons.

At this period each Australian colony had its own tariff, and it would perhaps be of interest to record the rates in each State on sugar, molasses, rum, &c., as set out in Mr. Roth's report on the sugar industry, published in 1880. The tariffs are—

I. QUEENSLAND.

Import duty—

Refined sugar	6s. 8d. per cwt.
Raw sugar	5s. ,,
Molasses	3s. 4d. ,,
Rum	10s. per gall.

Excise—

Spirits distilled within the colony from sugar-cane, a duty of two-thirds of the duties which are payable upon spirits of a like description imported into the colony.

II. NEW SOUTH WALES.

Import duty—

Refined sugar	6s. 8d. per cwt.
Raw sugar	5s. ,,
Molasses	3s. 4d. ,,
Rum	10s. per gall.

Excise—

On spirits made or distilled within the colony from sugar which has paid Customs duty 9s. 5d. per gallon.

III. VICTORIA.

Import duty—

Candy sugar	2d. per lb.
Glucose	3s. per cwt.
Raw sugar	3s. „
Refined sugar	3s. „
Molasses	3s. „
Rum	10s. per gall.

IV. SOUTH AUSTRALIA.

Import duty—

Sugar	3s. per cwt.
Molasses and treacle	3s. „
Rum	10s. per gall.

V. WESTERN AUSTRALIA.

Import duty—

Sugar	3s. per cwt.
Molasses and treacle	3s. „
Rum	14s. per gall.

VI. TASMANIA.

Import duty—

Rum	12s. per gall.
Loaf and crushed sugar, net	1d. per lb.
Other sugars, net	6s. per cwt.
Molasses, net	3s. 6d. „

And so in proportion for all sugars or molasses for any greater or less quantity than 1 cwt., not being less than 28 lb.

The net price realised for sugar for the five years preceding 1880 was about £22 10s. per ton for raw sugar. Mills turning out good whites realised higher prices. Mr. Roth said the average was low, not merely on account of the quality of the sugars, but in consequence of many of the small men being pushed for funds they were obliged to sell whether the market suited them or not.

The following are the net returns given per ton of sugar for Alexandra Mill, Mackay:—

	£	*s.*	*d.*
1868	32	0	0
1869	31	14	0
1870	28	16	0
1871	25	19	9
1872	25	5	10
1873	24	0	0
1874	18	5	1
1875	22	16	1
1876	24	8	3
1877	21	4	9
1878	20	5	3

When Queensland began to export the balance of sugars manufactured above the amount consumed, the price fell to its value in the world's market. The largest return any mill had made up to 1880 was 33 per cent. on its capital.

The consumption of sugar in Queensland with a population of 210,510 in 1878 was given as 92·13 lb., and was higher than in any other State; the lowest being South Australia, 71·31 lb.

[TO BE CONTINUED.]

THE 1929 FIELD WHEAT CROP COMPETITION.

By H. C. QUODLING, Director of Agriculture.

Although excellent rains fell in April throughout the wheat belt, the normal planting and growing season proved exceptionally dry, so much so that the initial arrangements made for the lodgment of entries and their confirmation at a later date could not be strictly adhered to. When good rains were experienced, however, in October the situation improved so rapidly that the Eastern Downs H. and A. Association, Warwick, made a special appeal and obtained a number of post entries, with the result that thirty-nine crops were judged in the Warwick and nine crops in the Toowoomba district respectively.

The competing crops gave indications generally of fairly high yields, these being obtained without recourse to fertilisers, the dominating factor in this respect being largely that of good preparatory cultivation, which undoubtedly enabled the crops to survive until the long-looked-for rains came just in time, as it proved, to ensure a bountiful harvest.

The practice of early planting once again demonstrated its value and enabled the wheat generally, not only to escape rust but to return also a higher yield. In the case of a few backward crops, however, soft and rapid plant growth, synchronising with exceptionally humid conditions, promoted the development of rust to such an extent that two entries were cancelled; otherwise the presence of the disease was not of a serious nature in the other competition crops, but cognisance had, of course, to be taken of it in allocating points.

PLATE 4.—"DUKE OF YORK" WHEAT, GROWN BY ZIESEMER BROS., BONGEEN, 1929.
Yield, 3,500 bags from 300 acres. The dark line near the skyline is the edge of an area of red-chaffed wheat.

Apropos of this particular competition, two classes of competitors were observed, the one who had made up his mind to compete before the season commenced; and the other who at the eleventh hour was out to assist his society in promoting a competition in the interests of the district. All credit is due to those who helped in this latter way, but the fact remains that too many points were lost for impure seed—for instance, the presence of barley, oats, &c.; also for ball and flying smut, and in a few cases for flag smut. Precautionary measures to meet these disabilities in the case of individual growers will naturally do much indirectly to ultimately improve the position of the industry. Obviously, also, the recent arrangement made between the Minister for Agriculture and the Wheat Board to have growing crops examined, with a view to obtaining grain as true to type as possible for use as seed next year after it is cleaned and graded, should be of some assistance to prospective competitors in future competitions. If the latter became a regular fixture much could be done by individuals to work up their own supplies of seed from ears selected in their own fields, or from pure stocks raised by the Department of Agriculture here, or as may be obtainable elsewhere. If, however, it is intended to import seed from the South, permission to do so should first be obtained from the Minister for Agriculture in Queensland so as to obviate the possible introduction of flag smut infected seed.

The standard of purity of crops in this State might reasonably be improved by confining the present or prospective Wheat Board premium for seed to those persons who enter for a crop competition, with the proviso that additional stocks of premium seed could be drawn, if required, from larger areas of land cropped with the same variety by each or any individual competitor.

FIELD WHEAT COMPETITION.

TOOWOOMBA DISTRICT.

Name and Address.	Variety.	Trueness to type and purity.	Freedom from disease.	Evenness of crop.	Condition.	Cleanliness.	Estimated Yield. Bushels per acre.	Total Points.
One point for each bushel up to 24 bushels, half a point for every additional bushel	..	20	30	20	10	20	..	..
*Zeisemer Bros., Bongeen	Duke of York ..	19·0	29·0	18·5	9·0	19·0	37·0	125·0
†G. J. Will, Kincora, Pittsworth	Duke of York ..	17·5	29·0	20·0	9·5	19·0	34·0	124·0
‡G. J. Will, Kincora, Pittsworth	Gluyas	18·0	29·0	18·5	9·0	18·5	36·0	123·0
C. Kreig, Brookstead	Duke of York ..	18·0	28·0	18·0	9·0	19·0	32·0	120·0
F. Flegler, junr., Irongate, Pittsworth ..	Clarendon	16·5	28·0	17·0	7·5	17·5	40·0	118·5
C. Kreig, Brookstead	Duke of York ..	18·0	27·0	17·5	8·0	18·5	33·0	117·5
H. C. M. Sharpe, Lavelle, Milmerran ..	Pusa	17·5	27·0	17·0	8·5	18·0	32·0	116·0
J. Flegler, junr., Irongate, Pittsworth ..	Currawa	16·5	27·5	17·0	8·0	17·5	34·0	115·5
Zeisemer Bros., Bongeen	Pusa	17·5	27·0	16·5	8·0	17·5	34·0	115·5

WARWICK DISTRICT.

Name and Address.	Variety.	Trueness to type and purity.	Freedom from disease.	Evenness of crop.	Condition.	Cleanliness.	Estimated Yield. Bushels per acre.	Total Points.
*F. Armstrong, Headington Hill	Pusa	17·5	28·5	17·5	9·0	17·0	45·0	124·0
†P. Imhoff, junr., Elphinstone	Duke of York ..	19·0	28·0	18·0	9·0	18·0	36·0	122·0
‡E. T. Box, Junabee	Waratah	17·0	27·5	17·0	8·0	17·5	42·0	120·0
C. F. Gillespie, Junabee	Roma Red	18·5	28·0	18·0	8·5	18·0	33·0	119·5
Gillam and Vaughan, Spring Creek, Clifton	Pusa	16·5	26·5	18·0	8·5	18·0	40·0	119·5
Free Bros., Junabee	Waratah	12·0	28·5	18·5	9·0	18·0	42·0	119·0
S. L. Saal, Pilton	Pusa	17·0	26·5	16·5	8·5	17·5	42·0	119·0
N. Skoien, Pilton	Pusa	16·5	27·0	15·5	8·5	17·5	42·0	118·0
D. Conway, Swan Creek	Waratah	17·5	27·0	17·5	7·0	18·0	38·0	118·0
W. G. Skerman, junr., Willow Vale ..	Clarendon	15·0	27·5	18·5	9·0	17·5	37·0	118·0
Mrs. N. I. Skerman, Willow Vale ..	Clarendon	15·0	27·5	18·0	8·5	17·5	38·0	117·5
T. C. Fletcher, Tannymorel	Waratah	16·0	27·0	16·5	7·5	18·0	38·0	116·0
T. J. Martin, Hermitage	Duke of York ..	18·0	27·0	18·0	8·0	17·0	32·0	116·0
R. F. Kemp, Junabee	Pusa	16·5	28·0	16·0	8·5	17·5	35·0	116·0
J. McGovern, Headington Hill	Pusa	16·5	27·0	17·0	8·0	17·5	36·0	116·0

FIELD WHEAT COMPETITION—*continued.*

WARWICK DISTRICT—*continued.*

Name and Address.	Variety.	Trueness to type and purity.	Freedom from disease.	Evenness of crop.	Condition.	Cleanliness.	Estimated Yield. Bushels per acre.	Total Points.
One point for each bushel up to 24 bushels, half a point for every additional bushel	..	20	30	20	10	20	..	..
D. McVeigh, Junabee	Waratah	16·0	22·0	18·0	8·5	17·0	42·0	114·5
E. J. Walsh and W. Palmer, Maryvale	Pusa	17·0	26·0	15·5	7·5	17·5	38·0	114·5
J. Brownlie, senr., Junabee	Duke of York	15·5	27·0	17·5	7·5	17·5	32·0	113·0
W. Sprott, Pilton	Pusa	15·0	26·0	15·5	8·5	16·0	40·0	113·0
J. Hallman, Freestone	Pusa	16·0	26·0	16·5	7·5	17·0	34·0	112·0
Con Roche, Maryvale	Pusa	15·0	27·0	15·5	8·0	17·0	34·0	111·5
L. T. Gillespie, Pilton	Currawa	15·5	24·0	17·5	7·5	16·5	35·0	110·5
J. J. Kemp, Junabee	Waratah	17·0	22·0	16·0	8·0	16·5	38·0	110·5
E. G. S. Bell, Clifton	Currawa	14·0	25·0	17·0	7·5	16·0	38·0	110·5
Gordon White Killarney	Waratah	15·0	26·0	16·5	8·0	15·5	34·0	110·0
S. F. Turner, Sladevale	Pusa	17·5	27·0	16·0	6·5	16·5	28·0	10·95
J. J. Booth, Junabee	Clarendon	13·0	22·0	18·0	6·0	18·0	38·0	108·0
W. T. Crane, Elbow Valley, Warwick	Waratah	14·0	28·0	14·0	6·5	16·5	32·0	107·0
F. E. Gillespie, Swan Creek	Clarendon	17·0	23·0	16·0	5·0	17·0	34·0	107·0
E. McConville, Swan Creek	Pusa	14·5	25·0	17·5	7·0	17·5	27·0	107·0
D. R. Brownlie, Junabee	Clarendon	16·0	20·0	17·0	8·0	16·0	34·0	106·0
Carey Bros., Warwick	Waratah	14·0	25·0	16·5	7·0	14·5	34·0	106·0
T. A. Brownlie, Junabee	Waratah	15·0	23·0	16·5	7·0	16·0	30·0	104·5
W. Chandler, Ellinsthorpe	Pusa	12·0	27·0	16·0	5·5	12·0	39·0	104·0
Alex. Johnson, Swanfels	Clarendon	15·0	24·0	15·5	7·0	14·5	32·0	104·0
P. Conway, Willow Vale	Clarendon	13·5	18·0	17·0	5·0	17·0	38·0	101·5
P. C. Gillespie, Swan Creek	Pusa	14·0	20·0	16·0	5·0	18·0	32·0	101·0
G. H. Guard, Junabee	Clarendon	8·0	22·0	17·0	7·0	16·0	33·0	98·5
J. A. Christmas, Mount Sturt	Pusa	13·0	20·0	18·0	6·0	8·0	39·0	96·5

* First, † Second, ‡ Third,

PLATE 5.

With this fine crop of "Duke of York" Messrs. Ziesemer Brothers, of Bongeen, Cecil Plains, were first in the Toowoomba District Competition (125 points) and in the Grand Championship.

PLATE 6.—WINNERS OF THE GRAND CHAMPION PRIZE IN THE FIELD WHEAT COMPETITION, 1929.

Messrs. Ziesemer Brothers alongside one of their tractors on Bongeen, Cecil Plains.

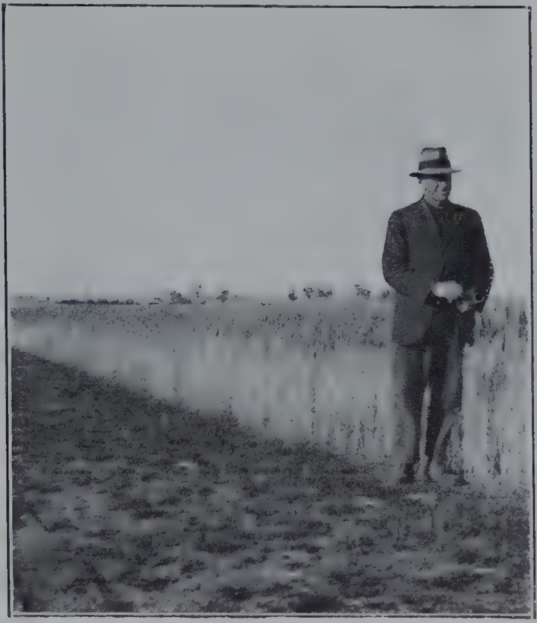

PLATE 7.—MR. G. J. WILL'S FIELD OF "DUKE OF YORK," KINCORA, PITTSWORTH.

Second, Toowoomba District Competition, and Second place with F. Armstrong in Grand Championship with 124 points. It was the only crop that gained full points (20) for evenness.

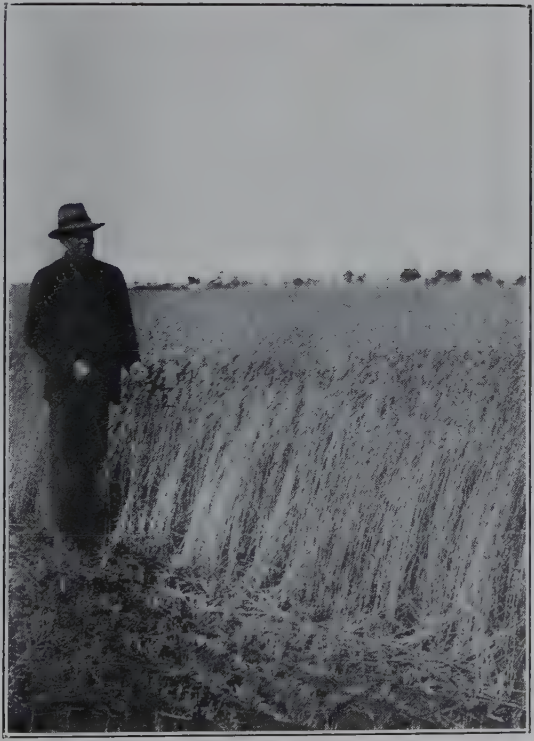

PLATE 8.—MR. G. J. WILL'S STAND OF "GLUYAS" AT KINCORA, PITTSWORTH.
Third in Toowoomba District Competition with 123 points.

PLATE 9.—MR. C. KREIG'S FINE CROP OF "DUKE OF YORK" AT BROOKSTEAD.

Mr. Kreig is a prominent member of the Wheat Board, a keen advocate of Wheat Crop Competitions as a stimulus to progress in farming.

PLATE 10.—J. FLEGLER, JUNR., AND HIS 1,500-ACRE CROP OF "CLARENDON" AT IRONGATE.

Mr. Flegler is one of the pioneer farmers in the Bongeen district who is cultivating a large area.

PLATE 11.—MR. H. C. M. SHARPE'S FIELD OF "PUSA" ON LOVELLE, MILMERRAN.
This farm is on Belah and Brigalow country, backed by a stand of virgin "scrub."

PLATE 12.

Another view of Messrs. Zeisemer Bros.' crop of "Pusa" on Bongeen, Cecil Plains. Last year 1,600 acres were under wheat, and 3,000 acres have been broken for this year's sowing.

PLATE 13.—THE WINNING CROP. MR. F. ARMSTRONG'S FIELD OF "PUSA" AT PILTON.

First Prize Warwick District Competition (124 points) and Second with G. J. Will (Duke of York) in Grand Championship.

PLATE 14.—THE CROP—"DUKE OF YORK"—OF MR. P. IMHOFF, JUNR., AT ELPHINSTONE.

"Oh, I am the grass that has conquered man
I am the King that is Bread!
Your armies and fleets are but fragile things
That await a nod of my head."

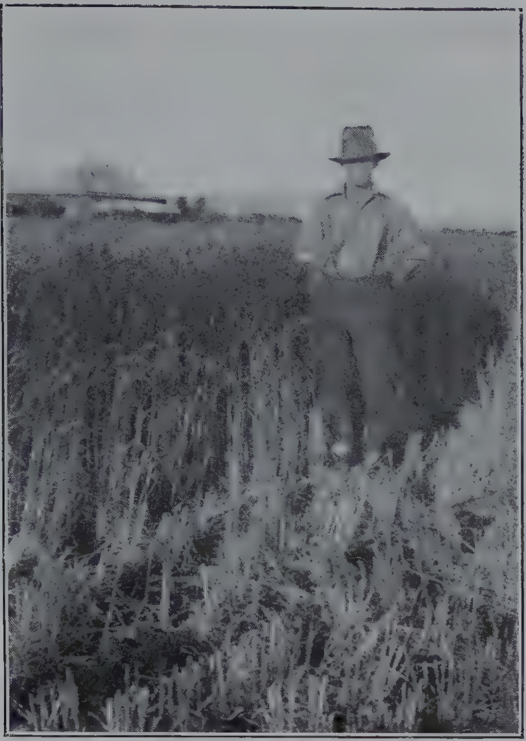

PLATE 15.—MR. E. T. BOX'S FIELD OF "WARATAH" WAS THIRD IN WARWICK DISTRICT COMPETITION WITH 120 POINTS.

PLATE 16.—MR. D. R. BROWNLIE, OF JUNABEE, HAD A GREAT SHOW OF "CLARENDON." D. R. is a son of J. Brownlie, junr., a pioneer farmer in the Junabee District.

PLATE 17.
This crop of "Roma Red" on Mr. C. F. Gillespie's Junabee property, near Warwick, was remarkable for its trueness to type and purity.

PLATE 18.—"PUSA" WHEAT ON MR. S. L. SAAL'S FARM AT PILTON.

Mr. Charles Clydesdale, Assistant Instructor in Agriculture, who, in co-operation with Mr. R. Soutter, Manager of the Roma State Farm, and under the direction of Mr. H. C. Quodling (Director of Agriculture), has done much to contribute to the success of the wheat-growing competitions, is in the picture.

PLATE 19.—MR. N. SKOIEN'S EXCELLENT STAND OF "PUSA" AT PILTON.

PLATE 20.—MR. JAMES MCGOVERN'S PADDOCK OF "PUSA" AT HEADINTON HILL.
The bonny colleens, Misses Kathleen and Norah McGovern, typify very charmingly the spirit of young Australia.

PLATE 21.—ANOTHER FINE CROP WAS THAT OF MR. W. G. SKERMAN, JUNR., WILLOWVALE, WHO SPECIALISED IN "CLARENDON."

PLATE 22.—MR. D. MCVEIGH HAD AN EXCELLENT CROP OF "WARATAH" AT JUNABEE.

Mrs. McVeigh, who is also keenly interested in crop competitions, is in the picture.

Plate 23.—A Field of "Pusa" on the Property of Messrs. E. J. Walsh and W. Palmer, Maryvale.

Mrs. Walsh, who is in the picture, is another keen agriculturist.

Plate 24.—Mr. W. Sprott, of Pilton, had a Fine Crop of "Pusa."

A portion of Pilton Station is used for share farming. Mr. Sprott was the winner of a previous competition.

"I am a song that the need of man has sung
From the soil at his feet;
Food-giver, keeper and saviour of life,
I am the grain that is wheat."

PLATE 25.—MR. J. HALLINAN, OF FREESTONE, HAD A FINE CROP OF "PUSA."

PLATE 26.—MESSRS. CAREY BROS.' FINE CROP OF "WARATAH" AT WARWICK.

"Over the face of your rolling hills, over your plains afar,
I have strung you a necklace of gold to wear whose fame is like a star."

PLATE 27.—"PUSA" WHEAT ON MR. W. CHANDLER'S PROPERTY, ELLINTHORPE, DARLING DOWNS.

There is some rich country on Talgai West, and the young farmer in the field is obviously proud of his share in raising the crop.

PLATE 28.—A FIELD OF "NOVO" ON MR. W. MCKENZIE ALLEN'S FARM AT EMU VALE.

This crop was non-competitive.

PLATE 29.—A FIELD OF "DUKE OF YORK" ON MR. J. T. MARTIN'S PROPERTY AT HERMITAGE.

To-day wheat-growing has become a highly specialised business on the Darling Downs, and progressive farmers in every district give close study to the details of agricultural practice that make for high yields.

PLATE 30.—A NON-COMPETITIVE CROP OF "PUSA" GROWN ON MR. EVANS' FARM, PILTON.

PLATE 31.—REAPER THRESHERS AT WORK ON ZIESEMER BROS. FARM AT BONGEEN.
1,200 bags were taken off first round; three tractors and five harvesters were employed.

THE BOUNTIFUL SOUTH BURNETT.

The "South Burnett Times" has this to say of district progress:—Twenty-five years ago the South Burnett district was of no greater account than dozens of other similar localities in the State where the forest lands fattened a fair quota of Herefords and the scrub lands were looked upon merely as harbours for vermin and refuges for "scrubber" cattle. True that Nanango was then an old township as the administrative centre of the then pastoral district; but Kingaroy and Wondai were in swaddling clothes; Murgon's only architecture was an 8 by 10 galvanised iron railway station; and Goomeri comprised only the railway buildngs and trucking yards. What a metamorphoris has been effected in the interim—how the primeval wildernesses of scrub-clad wastes and far-flung little-improved cattle runs have been transformed into what may be confidently stated to be the most productive district in a rich State—is revealed in the "Report of the Registrar-General on Agricultural Production for the year 1928" recently to hand. In last issue it was commented that the maize production for 1928 of Nanango and Weinholt districts comprising the South Burnett, 1,129,502 bushels from 24,822 acres was easily first, Atherton with 901,642 bushels from 21,408 acres being next. But it is perhaps in the figures of the dairying industry that the productivity of the South Burnett is best displayed. The number of cows in milk in Weinholt-Nanango is shown as 58,284 (next Gympie, 38,906), dairying establishments 1,844 (Gympie 1,163), milk production 20,766,965 gallons (Gympie 12,511,288) and butter made 10,741,654 lb. (Gympie 8,025,578). Yet more remarkable, however, is the extent in which the South Burnett outstands in the pig industry. The number of pigs in Nanango-Weinholt is shown as 32,462, both of the subdistricts exceeding Gympie's 12,365, the next being Beaudesert with 9,401. In the matter of areas of artificially sown pastures (Rhodes grass, paspalum, &c.) Gympie's acreage of 102,436 exceeds the South Burnett total of 94,199, though the Registrar-General would probably find some difficulty in explaining why Nanango's total of 54,954 acres in 1927 should have dropped to 47,362 acres in 1928 although additional scrub areas had been felled and grassed. In area under cultivation South Burnett with 92,777 acres comes first, with Clifton 91,820 acres next. In the value of farm machinery and implements South Burnett's total of £419,980 is second only to Ayr with £673,910 (sugar production) though it is a big drop to the next, Mackay (also sugar) £333,672. In farming and dairying, 6,322 persons are employed in the South Burnett as against 4,808 in the next district (Gympie). In the number of poultry on farms South Burnett's total of 72,367 is second only to Brisbane's 75,428, the third highest figures being for Maroochy. The report does not disclose the South Burnett domination of the peanut industry of a gross annual value of upwards of six figures sterling, but the area under "other crops" in Nanango and Weinholt is shown at 9,126 acres, although 994 is the largest area under similar heading in any other district. The pre-eminence to which our district has attained in matters agricultural and pastoral is proof positive of the progressiveness and industry of its pioneers, but its potentialities are in no way exhausted, and further records will yet be achieved by our rich heritage.

A DISCUSSION ON CALCIUM AND PHOSPHORUS DEFICIENCY OF THE SOIL IN RELATION TO ANIMAL NUTRITION.

In December, 1928, a meeting was arranged by the Veterinary Association of South Australia, for the purpose of discussing some of the aspects of mineral deficiency of the soil in relation to animal nutrition.

Members of the Department of Agriculture, of the Waite Agricultural Research Institute, of the University of Adelaide, of the Nutrition Laboratory, Council for Scientific and Industrial Research, and of the Veterinary Association met together for the purpose of the discussion, which was opened by the reading of the following papers:—

1. *"Some Diseases of Stock in South Australia Considered to be Due to Mineral Deficiency." C. T. McKenna, B.V.Sc., M.R.C.V.S.*
2. *"Soil Deficiency in Calcium and Phosphorus." Professor J. A. Prescott, M.Sc.. (Manc.).*
3. *"The Physiology of Phosphorus and Calcium in Animal Nutrition." Professor T. Brailsford Robertson, Ph.D., D.Sc.*

These papers were published in "The Journal of Agriculture of South Australia" for July, 1929, and through the courtesy of that Journal they are now reprinted for the benefit of our readers.

PAPER I.

SOME DISEASES OF STOCK IN SOUTH AUSTRALIA CONSIDERED TO BE DUE TO MINERAL DEFICIENCY.

Arranged and presented for the Veterinary Association by C. T. McKENNA, B.V.Sc., M.R.C.V.S., Veterinary Officer, Stock and Brands Department, Adelaide.

CALCIUM and phosphorus are necessary for the development of the skeleton of animals as well as for bodily functions. A deficient intake of these minerals places a limit on the full development of an animal; but, apart from this, there are definite diseases which result from an inadequate or an unbalanced intake. In many instances it is mainly a matter of the degree of the deficiency which determines the presence or absence of frank abnormality or disease.

It is in dairy cattle, and to a much less an extent in sheep and pigs that diseases of mineral deficiency have been principally observed. The horse in this State appears to be comparatively free from frank manifestations of such diseases. Cases of Pica have occurred, where licking of earth, gnawing of bark off trees, and eating of superphosphate have been observed. Only one case of bone-chewing has been recorded, and that occurred in an outbreak of Botulism in farm horses at Mannum. A condition usually known as Osteoporosis of the horse, which is common in Victoria, has not been observed in this State.

There are several diseases in dairy cattle which are recognised as being due either to deficient intake of phosphorus or calcium, or to disturbance of the metabolism of these minerals which may be associated with deficient intake either of the minerals or some other substance essential to their proper assimilation and use by the animal. These diseases are:—

1. Pica.

Pica or depraved appetite, which manifests itself in a desire to chew bones chiefly, and to a less extent, dirt, putrefying carcases, leather, &c. Badly affected cattle are usually in poor condition, unthrifty in appearance, move in a listless manner, and their milk supply is below normal. The best cows, i.e., the best milkers, are generally the worst cravers. It is considered that the eating or chewing of putrefying bones and flesh denotes a bad case of Pica, or in other words, a bad craver. Again, there is a seasonal incidence. The craving is acute during the dry time of the year, and tends to diminish or disappear when the flush of feed comes on. During periods of drought Pica is more common and more intense in its manifestations.

With the probable exception of certain small, rich areas of country like the Booborowie Flats and Reclaimed Murray River Lands, there are no parts of South Australia where we can say that Pica does not exist.

Some of the worst "Pica" areas of the State are:—

(*a*) Coastal area extending north of Adelaide to Port Wakefield.
(*b*) All newly opened mallee lands.
(*c*) Kangaroo Island.
(*d*) Coastal areas of the West Coast (Eyre Peninsula).
(*e*) Lake district (River Murray Mouth).

BOTULISM.

Pica is associated so closely with one disease which is common in cattle—I refer to Botulism—that that disease is worth mentioning here for two reasons:—

(*a*) It is an indication of the incidence and severity of bone-chewing in the State, and

(*b*) Many cases of so-called "Paralysis" in cattle associated with bone-chewing are met with, which are termed Botulism, but which may only be a form of nutritional disease.

Up to a few years ago Botulism was exceptionally prevalent in the mid-north areas of this State. At that time it was known as "Dry Bible." Orroroo, which was then a big dairying centre, was a particularly notorious area for losses from this disease. With the advent of phosphatic manures in wheat cultivation, the eradication of vermin, and the proper disposal of carcasses, much of this trouble has now ceased, though it is still comparatively common in this area.

Botulism in cattle in due to the absorption from the digestive canal of toxin produced by at least three types of Bacillus Botulinus. The toxin is formed in damaged food or in decaying animal tissues. When the disease is produced by the ingestion of decaying animal tissues, Pica is usually an essential link in its production. Botulism is usually fatal. The symptoms are briefly as follows:—(1) In-co-ordination of movement, which is first indicated by stiffness of gait. There is a general loss of muscle power, and later the animal goes down and is unable to rise. (2) There may be paralysis of powers of mastication and deglutition. (3) Obstinate constipation and unthriftiness.

2. Paralysis.

Under this heading are grouped various forms of paralysis which are met with all over the State. These cases are extremely common, and are met with under the most diverse conditions. It is possible that these diseases have a nutritional basis, but it is not certain. Some examples are:—(*a*) *Milk Fever* (Parturient Paresis).—Recent investigation of this disease has emphasised the fact that Tetany is the essential clinical manifestation, and the belief is expressed that the essential nature of this is a Parathyroid failure, with a resultant fall in blood calcium. (*b*) *Post Partum Paralysis.*—Cows in high condition are most frequently affected. They go down after a normal calving and cannot rise. The hindquarters appear to be paralysed. (*c*) *Anti Partum Paralysis.*—The symptoms are similar to the post partum type, but the disease usually occurs within the month prior to calving. (*d*) Another type of "Paralysis" has been reported from various parts of South Australia, and particularly, during the last two years, in dairy herds in the Salisbury district. A number of the herd go down suddenly and are unable to rise. They attempt to do so, but cannot use the hindquarters. Otherwise the affected animals appear normal. They are in different degrees of lactation, and cases have been recorded from March to September.

3. Stiffness.

Several types of so-called "stiffness" have been noted and recorded in cattle. Affected animals have an unthrifty appearance, and are poor milkers. They move in a slow, listless manner, and they take short, stilted steps. Many suffer from constipation. The condition is generally associated with bone-chewing, and marked improvement is obtained by the regular administration of bone-meal to affected cows.

4. Rickets.

Cases of this disease have been observed in young dairy stock, but it would appear to be a rare condition in this State.

DISEASES OF SHEEP.

The diseases of sheep which may be mentioned are as follows:—

1. Pica.

This affection is uncommon in sheep, and has only rarely been recorded. A case of bone-chewing is mentioned later.

2. Paralysis.

As in cattle, sheep show various forms of this condition. Examples are:—

(*a*) *Pregnancy Disease*.—It is very common on the wheat and sheep farms of the Mid-north, and also in those parts of the State where breeding ewes are kept on small areas of rich feed. Severe losses have occurred during last weeks (2-4 weeks usually) of pregnancy. They are commonly in high condition, and usually are carrying twin lambs. Signs of the malady are that ewe lags behind and separates from the rest of the flock. Nervousness, grinding of the teeth, and a high-stepping movement have been noticed. Some ewes apparently suffer from loss of sight, which appears to be of nervous origin. Twitching of muscles around nostrils and mouth has been noted. Later there is loss of control of hindquarters, and ewe goes down and is unable to rise, though attempts to do so are made. The post-mortem examination shows an abnormal condition of liver (fatty infiltration of a severe type). Although this disease probably has a nutritional basis, there is as yet no definite evidence that it is associated with a deficient mineral intake.

(*b*) This type of Paralysis can best be described by giving a description of two outbreaks:—

(1) Coomandook Outbreak (October, 1928).—A wheat and sheep farm in this area was concerned. The farm had been established twenty years, and all pastures had been topdressed. The Paralysis was confined to lambs, 2-4 months old, and 11 per cent. were clinically affected. The trouble started at the beginning of August. *Symptoms*.—Affected lambs lag behind flock and go down after a short walk. They get worse, and are unable to rise, or if they do only stagger a few yards and go down again. Some are affected chiefly in hind limbs, others in fore limbs. Muscular trembling of limbs was noticed. Otherwise the affected lambs appeared normal.

(2) Keith Outbreak.—A similar condition was observed in a mob of 200 lambs about four months old on a wheat farm in this area; forty were affected. The majority were lying down when first seen; on disturbing them, they only remained on their feet for a few minutes. Some only showed a stilted gait. Their condition was good. Several which were examined showed muscular tremblings in their hind limbs. In connection with this outbreak, the following information was obtained:—For portion of year sheep were put on bush country, which is a part of the 90-mile Desert. Whilst there sheep have been frequently observed chewing bones. Again, limbs of some are easily fractured, and bones of many can be cut with a knife.

3. Lameness.

A peculiar lameness in sheep has been observed and reported on certain holdings in the north-east of the State. On one station 40 per cent. of the ewes in 1921 showed lameness, and many of these had a deformity of the elbow joints. In 1925 a similar per cent. of the ewes showed the same condition. Certain areas (watercourses) of the holding seem to be associated with the trouble.

The condition is an osteo-arthritis of elbow joints chiefly; all joints of limbs may show more or less erosion of articular cartilages. The bony changes have developed over a considerable period. No evidence of an infective process has been found.

4. Brittleness of Bone.

Reports have been received from farmers in the areas given below that sheep show brittle bones. When catching sheep by a hind limb it commonly fractures. These areas are South-East (Kingston), coastal area of Eyre Peninsula, and southern end of Yorke Peninsula.

In conclusion, we may mention one of the nutritional diseases in the pig. It is recognised that dietary factors, housing, and other forms of management of this animal play an important part in producing the disease. The following condition is very frequently reported:—

The affected pig is first noticed to be paddling with hind legs whilst feeding. There is later slight loss of control of hind legs, accompanied by knuckling over at the fetlock joints. Finally pig goes down and seems to be paralysed in hindquarters. It often sits up like a dog and can pull itself along with the forelegs to feed. Swine of all ages can be affected, and they are usually in good condition. Although this disease is apparently nutritional in origin, its exact cause has not yet been determined.

PAPER II.

SOIL DEFICIENCY IN CALCIUM AND PHOSPHORUS.

By J. A. PRESCOTT, M.Sc. (Manc.), Waite Professor of Agricultural Chemistry, University of Adelaide.

In dealing with the subject of soil deficiencies, the agricultural chemist in the past has considered the problem mainly from the point of view of crop production and plant nutrition, rather than from that of animal health. The chemical and physical characteristics of the soil are known to have a direct influence on the character of the pasture, and the main object and interest in the top dressing of pasture land has been that of increasing the carrying capacity of the land rather than the improvement in the health of the stock, although the two were naturally known to be frequently associated. Of the elements essential for the proper nutrition of plants, only three—nitrogen, phosphorus, and potassium—have acquired the status of recognition as artificial fertilisers, salts of calcium being usually considered as soil amendments rather than as plant foods, the purpose being to correct soil acidity or alkalinity, or the improvement of physical properties.

The quality of a pasture from a nutritional point of view is controlled by a number of purely botanical factors, such as stage of growth and the relative proportions of grasses, leguminous plants, and what are generally known as miscellaneous herbage. Modern livestock, with their higher output of meat, wool, and especially milk, make special demands on the pasture, and what may possibly be a bare maintenance ration for the frugal Merino sheep may be seriously deficient for a dairy cow in full milk.

It is a well-known fact that the energy-value of poor and healthy pastures is approximately the same—in the neighbourhood of 270 calories per 100 gms.—but that in mineral content the variation is much more important. At the present stage of investigation, the study of the soil and of the pasture must be correlated with experimental work with the animal, and our diagnosis of soil deficiency must be based rather on the report of the veterinarian than on a chemical examination of the soil, until such times at least as a standard of reference has been established.

The known deficiency of the soils of the Australian wheat belt in phosphorus has been established, not so much by a chemical analysis of the soil as by an important series of field experiments in the various States, although the chemical analyses certainly directed the attention of our agriculturists to the need for these experiments.

Soil Calcium.

In Australian soils, calcium may exist in at last four forms—

Gypsum. Calcium Carbonate. Exchangeable Calcium. Mineral Calcium.

Gypsum occurs either as a natural product of soil and rock weathering, or when in larger amounts as a saline deposit such as would occur under estuarine or salt marsh conditions. Crystals of gypsum generally occur in the lower horizons of some of the heavy black soils characteristic of parts of New South Wales and of the Wimmera, while soil horizons rich in gypsum are known from the irrigation settlements of Mildura and Renmark.

Calcium carbonate is a universal soil constituent in our more arid regions, and most of our soils receiving 20 in. and less of rain show a characteristic lime enrichment in the lower soil horizons. It is difficult to believe that under these conditions a true deficiency of calcium can exist. Even where calcium carbonate is absent, calcium forms the principal reactive constituent in the exchangeable bases of the soil, and a leaching out of the calcium in this form soon shows itself in soil acidity. Mineral calcium may be taken to indicate the calcium which is present in the unweathered silicate minerals, and will consequently have a low availability. The first three forms of calcium are all readily available, and in fact the soil solution consists primarily of a dilute solution of calcium bicarbonate.

The safest index of relative calcium deficiency in the soil is probably the hydrogen ion concentration. On the pH scale, with a neutral point at pH7, calcium carbonate in equilibrium with the carbon dioxide of the atmosphere gives a value of pH 8.4, while in Australia acid soils are known from pH 4.0 on the acid side to pH 9.6 on the alkaline soil. The reaction of the soil appears to depend on two principal factors, one the amount of leaching by rain or swamp drainage, and the second the amount of calcium carbonate present in the original parent material. The volcanic ash of Mount Gambier is, for example, relatively rich in calcium carbonate, and hence soils on this formation are frequently less acid than would be expected from a 30-in. rainfall. A critical pH value for many pasture plants would appear to be in the neighbourhood of pH 6, although some crops, such as oats and potatoes, will flourish in more acid soils. In South Australia, soils more acid than pH 6 occur only when the rainfall is 30 in. or more, and it is mainly in the Adelaide Hills that one would look for cases in which the soil would be likely to respond to treatment with lime. The lower Murray Swamps are also characteristically acid soils.

It is evident that veterinary troubles, due directly to calcium deficiency in the soil, could be expected to occur in a relatively limited area of the State.

Soil Phosphorus.

All soil phosphorus must ultimately owe its origin to the apatite that occurs in most igneous rocks. In soils derived from sedimentary rocks, the phosphorus present may have passed through organic form at some time or other, but will probably be found in the soil principally as calcium phosphate or fixed in the complex reactive alumino silicate portion of the soil which is responsible for base exchange. The quantity of phosphate in the soil is much less dependent on climatic conditions than is the case with calcium, and as it is never very high, is probably mainly related to the geological origin of the soil. In South Australia few soils have a high content of phosphoric acid. The volcanic ash of Mount Gambier is outstanding in this respect.

A statistical review of the information available in the records of the various State chemical laboratories concerning soil phosphate and the correlation of this information with the result of field experiments, and the occurrence of stock disease would be of considerable value; but it will be sufficient to indicate a few cases in which such definite information is available, using the total phosphoric acid present as a crude, but only available, measure of the phosphorus content of the soil. Table I. is very instructive indeed, and illustrates the relative poverty of South Australian soils in this respect.

Phosphate Content of Some Australian Soils, with Special Reference to Phosphorus Deficiency Diseases in Stock.

	Per cent. P_2O_5.
Queensland: Good grazing land	0.37
New South Wales: Black soils	0.18
New South Wales: Red soils	0.12
New South Wales (South Coast): Healthy	0.11
Mount Gambier (South Australia)	0.20-0.40
Wimmera (Victoria)	0.05
Mallee (Victoria)	0.05
New South Wales (South Coast): Bone chewing	0.03-0.05
Queensland: Osteomalacia	0.02
Kybybolite (South Australia): Unthrifty stock	0.014
Waite Institute (South Australia)	0.04
Lower North (South Australia)	0.03

PAPER III.

THE PHYSIOLOGY OF PHOSPHORUS AND CALCIUM IN ANIMAL NUTRITION.

By T. BRAILSFORD ROBERTSON, Ph.D., D.Sc., Chief of the Division of Animal Nutrition of the Commonwealth Council for Scientific and Industrial Research, at the University of Adelaide, South Australia.

Phosphorus.

We are acquainted with four distinct functions which are performed by phosphoric acid in the animal body. These are as follow:—

1. As an integral constituent of nucleic acid, phosphoric acid enters in an essential fashion into the composition of the nucleus of every cell in the body. Since the constituent of the nucleus which stains with haematoxylin is nucleic acid and modern genetic research has shown that those elements of the nucleus which stain with haematoxylin (chromosomes) are the actual conveyors of hereditary characteristics from parent to offspring, it becomes clear that in this sense phosphoric acid forms an essential constituent of one of the governing factors in development.

2. As an integral constituent of the phospholipins, in the form of a substituted glycero-phosphoric acid, phosphoric acid again enters into the composition of every living cell. The phospholipins, in turn, perform a multiplicity of functions. They are unique substances in that, being fats and having the physical properties and solubilities of fats, they are nevertheless soluble in water. When dissolved in water they are able to carry other fats, not normally soluble, into solution. By their influence upon surface-tension they modify the permeability of cells—that is, their capacity to take up from surrounding media materials which are not soluble in water. (Overton, Nathanson, Heilbrunn.) There is reason to suspect that phospholipin is the mobile form of fat in the body, just as glucose is the mobile form of carbo-hydrate. (Bloor.) As structural materials and, perhaps, for the reason that they are very readily oxidisable materials, the phospholipins enter to a remarkable extent into the composition of nervous tissues. To Liebig we owe the aphorism:—"Ohne phosphor, keine gedanke." Of course, as Verwon pointed out, exactly the same aphorism might have been enunciated for nitrogen or carbon or, for that matter, for hydrogen, oxygen, and other elements; but Liebig's statement serves to emphasise the fact that phosphoric acid is singularly concerned in the maintenance of the normal functions of the nervous system.

It also appears, from recent work, that phospholipins can catalyse the synthesis of protein in the tissues, through orientation of the molecules of amino-acids at their surfaces in such a fashion that the amino- and carboxyl-groups of adjacent amino-acid molecules are brought nearer to one another (Robertson, Marston, Wasteneys, and Borsook), and it has been shown that the mitochondria, fine granules in the protoplasm of cells which are believed to be the centres of protein synthesis, are largely composed of phospholipin (Arnold, Horning, and others).

3. The investigations of Embden have shown that the anaerobic oxidation of glucose in muscular tissue, with production of lactic acid as the side reaction, involves the preliminary formation of a hexose phosphate. Phosphoric acid must, therefore, be essential for the normal oxidation of carbohydrate and the production of muscular energy.

4. In the form of disodium phosphate, phosphoric acid plays a minor but essential part in maintaining the neutrality of blood and other tissue fluids (von Bunge, Henderson, van Slyke), through the occurrence of the reaction:—

$$Na_2HPO_4 + CO_2 + H_2O = NaH_2PO_4 + NaHCO_3$$

whereby CO_2 is neutralised without appreciable effect upon the neutrality of the mixture.

5. Finally, as a structural element, in the form of tricalcic phosphate, phosphoric acid is essential for the construction of bones, and, in consequence, the mechanical support of the tissues. This is usually the only function of phosphoric acid to which any attention is devoted in studies on the nutrition of farm animals. A perusal of the foregoing list of ascertained functions of phosphoric acid will reveal at once the inadequacy of this conception of the role of phosphoric acid in the body of an animal. It is obvious that deficiency of this substance in the dietary of an animal must injure its welfare in a multiplicity of ways, and we must expect the pathological syndrome consequent upon such deficiency to be of a very complex character and far-reaching in the modifications of normal function which it may induce.

Calcium.

Calcium, on the other hand, plays, so far as our knowledge as yet extends, only a limited number of roles in the bodily economy. As a structural element it enters, with phosphoric acid, into the composition of bone. For some reason not yet fully understood, but probably related to the maintenance of the colloid structure of protoplasm, calcium ions must always be present in tissue fluids in a certain proportion to the sum of sodium and potassium ions, otherwise normal permeability of the cell-surface cannot be maintained, and disordered function or death will ensue (Leob, Osterhout). In the aggregate of tissues forming a vertebrate animal, the first tissues to display disorder when this ratio is upset are the nervous tissues (Loeb). If the upset of balance is acute and sudden, the cerebellum is the first part of the nervous system to be affected, and the power of the animals to orient and equilibrate themselves in space is lost (Robertson and Burnett). If, however, the upset of ionic balance is gradual and chronic, supplies of calcium are mobilised from other tissues and rendered available to preserve an approximation to the normal ionic (Ca to Na) ratio in the blood. This is shown by the fact that a definite tolerance to citrates can be established by continued injection (Robertson and Burnett), and also by the well-known fact that a continued heavy drain upon the calcium stores of the body, as in heavy milk production with insufficient intake, or continued consumption of plants of the type of *Oxalis*, which are rich in oxalic acid, the bones may be rendered thin and fragile, showing that the calcification of bone is a reversible process, and that the bones are really reservoirs of lime, which can be drawn upon when the need of the animal is sufficiently urgent.

Owing to the diversity of the functions performed by phosphoric acid in comparison with calcium, the proportion of phosphoric acid contained in the body as a whole is somewhat in excess of that required, to form tricalcic phosphate. Phosphoric acid must, in other words, be assimilated in excess of the amount necessary to combine with the calcium contained in the body. This is particularly true in the embryo, in which the proportion of nuclear material is high and the bones are, as yet, barely calcified at all. As the animal grows to the adult condition, the proportion of tricalcic phosphate in the body as a whole increases. The changes in the proportions of phosphoric acid to lime which accompany growth have been studied by Sherman and Quinn ("Journ. Biol. Chem.," vol. 1926, p. 667). They show that, in the new-born animal, the proportion of calcium to phosphorus is about one atom of Ca to two of P. During suckling the phosphorus in the body increases sevenfold, the calcium, however, twelvefold, from which we may compute that Ca and P atoms are assimilated at this stage in the proportion of one to one. Now the proportion of Ca to P in tricalcic phosphate is three to two, while the proportions assimilated in suckling are three to three. In other words, there is still 50 per cent. excess of phosphoric acid intake over that necessary to form bone from the lime intake. Corresponding to this we find in milk, besides tricalcic phosphate, a considerable excess of phosphoric acid compounds containing a smaller proportion of lime (casein, phospholipins, &c.). On the whole, between birth and the attainment of adult dimensions, the ratio of Ca to P assimilated is 2.5 to 2—*i.e.*, corresponds to a mixture of equal parts of dicalcic and tricalcic phosphates. During prenatal growth, on the contrary, the proportions approximate to those in monocalcic phosphate.

Monocalcic phosphate	$Ca\ (H_2PO_4)_2$;	$Ca : P = 1 : 2$
Dicalcic phosphate	$Ca_2\ (HPO_4)_2$;	$Ca : P = 2 : 2$
Tricalcic phosphate	$Ca_3\ (PO_4)_2$;	$Ca : P = 3 : 2$

The diversity of purpose for which phosphoric acid can be employed in the tissues of an animal involves its presence therein, as I have indicated, in a diversity of combinations. This raises the question whether any of these various compounds of phosphoric acid, other than inorganic phosphates, may not be more readily utilised by an animal if presented to it in a preformed condition, as they are in the natural herbage, rather than when phosphoric acid is presented in the form of inorganic phosphates. It will be clear from the foregoing that it is not sufficient guarantee of normality to find that bones grow normally, or that the phosphoric acid content of the blood, or even of the whole animal, is normal. Before we can be thoroughly satisfied that the requirements of the animal have been fully supplied, we must ascertain that the relative proportions of the three main classes of phosphoric acid compound in animal tissues—namely, nucleic acids, phospholipins, and phosphates—are present in the animal in the proportions natural for its age.

I have raised this question for two reasons. In the first place, investigations in my laboratory have shown that even such closely related compounds of phosphoric acid as animal and plant nucleic acids may be differently utilised by animals. In the second place, so far as I have been able to observe, attempts to supplement pastures which are deficient in phosphoric acid by means of licks containing inorganic phosphates, although successful in overcoming the most severe symptoms of deficiency, nevertheless fail to restore complete normality. Even the bones remain more friable than those of animals fed upon pastures which are comparatively rich in phosphoric acid.

Quite apart from the question of organic *versus* inorganic compounds of phosphoric acid, there is another very important reason why the administration of phosphates in a lick may fail to accomplish all that we might hope.

Phosphates taken by mouth cannot be absorbed to any appreciable extent from the stomach. On arrival in the intestine, however, they meet an alkaline medium, and, if lime be present, phosphoric acid will be precipitated as di- or tricalcic phosphate, wholly or in part, in proportion to the calcium present and the degree of alkalinity. It is possible that a part of the calcic phosphates may be held in suspension by colloids, and thus, notwithstanding their insolubility, may conceivably be absorbed from the intestine in a colloidal condition. If absorption does not precede precipitation, or the precipitated phosphates are not absorbed from a colloidal suspension, then the precipitated phosphates of lime must pass through the intestine unaltered, and into the fæces, and thus become lost to the animal and restored to the soil. Reduction of lime in the diet will facilitate absorption, but then some of the phosphoric acid which is absorbed cannot be utilised in bone-formation for lack of sufficiency of lime to manufacture tricalcic phosphate, and consequently the excess over that which can be utilised for other purposes in the body appears in the urine and is lost to the animal by this channel. On the other hand, increase of lime in the diet increases utilisation but diminishes absorption. The animal must, therefore, steer a very fine course between defective absorption on the one hand, and defective utilisation on the other, to obtain the lime and phosphoric acid which it needs for bone formation. It is, in fact, quite readily possible to induce a rachitis-like condition in animals on a diet containing abundance of either phosphoric acid or lime, by simply administering an improper proportion of the two. (McCollum, Hess, and many others.) It is for these reasons, also, that even on a diet of natural foodstuffs the phosphates are rarely utilised to a greater extent than 50 per cent.

Experiments have been undertaken in which the phosphoric acid and lime were administered separately to milch cows, and at different times of the day, with a view to keeping them apart in the intestine by interposing a space between them. Phosphoric acid was administered in the form of sodium phosphate, calcium in a hay which was very rich in lime (Meigs and Woodward, United States Department of Agriculture, Bulletin No. 945, 1921), but I am not aware that the advantages of this procedure have ever yet been quantitatively evaluated. Increase of milk yield was obtained, of course, but was not compared with the increase which might have been obtained by administering the calcium and the phosphoric acid together. Organic compounds of phosphoric acid, however, possess the advantage over inorganic phosphates that the phosphoric acid is only slowly liberated during digestion, and may be absorbed before the concentration of phosphoric acid in the intestine reaches the critical value at which precipitation of calcium phosphates occurs. Glycerophosphoric acid, in particular, which is derived from the partial digestion of phospholipins, forms a soluble calcium salt, and all the salts which it may form in the intestine are so soluble that it is conceivable that they are absorbed as such, without the liberation of free phosphoric acid.

Interesting Experiments.

In this connection, the experiments of Forbes, on the utilisation of various compounds of phosphoric acid and hypophosphorous acid by pigs, are of exceptional interest. (Ohio Agric. Expt. Station, Technical Bulletin No. 6, March, 1914.) The pigs were fed upon a diet which was very deficient in phosphoric acid, and not containing quite enough lime to fulfil the maximum requirements of the animals. It is not certain, therefore, that the utilisation of phosphoric acid was in any instance the maximum attainable had the diet contained more lime. The phosphates, glycerophosphates, and hypophosphites administered were mixtures of the salts of sodium, potassium, calcium, magnesium, and iron. The nucleic acid was derived from yeast. Ten-day periods were employed. In the first experiment, illustrative of the rest, the following were the results obtained:—

Phosphorus Compound Administered.	Per cent. of Phosphorus Administered which was Retained.
Phosphates	51
Nucleic acid	58
Glycerophosphates	47
Hypophosphites	20

It is at once evidence that the reputed value of hypophosphites is mythical.

Although the utilisation of glycerophosphates was not seemingly so good as that of phosphates or nucleic acid, in all of the experiments these animals were the most spirited and lively. They were the only animals which consistently maintained their appetite and displayed no tendency to develop digestive disorders in consequence of the addition of the phosphoric acid supplement to the diet. In a repetition of the experiment, on comparing the breaking-strength of bones from the different lots, the following were among the figures obtained. (It is necessary to bear in mind the fact that all of the diets were moderately deficient in lime):—

Phosphorus Compound Administered.	Gain (+) or loss (—) in Breaking Strength.	
	Femora. Per cent.	Tibiæ. Per cent.
Hypophosphites	—37.0	—39.1
Hypophosphites + Nucleic Acid	—11.6	—26.4
Glycerophosphates	+28.7	+16.4
Phosphates	+11.3	— 4.1
Low phosphorus basal ration	—26.5	—29.5

It is at once evident, from such results as these, that it is not at all a matter of indifference in what form phosphoric acid is administered to animals to supplement their pasture. In our field-station experiments in phosphoric acid deficient districts we propose to administer various supplements, rich in phosphoric acid, and investigate, not only the growth and condition of the animals and their wool, but the effects of the supplements upon the proportions of the three main classes of phosphoric acid compound in the tissues of the animals. This has not hitherto been possible, owing to the lack of a convenient method of estimating nucleic acid. As a result of nearly two years' work, however, we have recently perfected a method which will permit the estimation of the nucleic acid content of 20 grammes of tissue to within 1 per cent. of its value. Standard methods of estimating phosphoric acid in phospholipins and phosphates are, of course, available. Definite organs will be sampled and analysed in normal sheep, sheep upon deficient pastures, and sheep upon deficient pastures which have been supplemented in various ways, and the results of these analyses supplemented by blood and bone analyses. From such experiments it should ultimately be possible to ascertain what admixture of inorganic phosphates and organic supplements will most closely approximate to the provision of phosphoric acid in the forms and proportions in which it is conveyed to animals by pastures which have been heavily supered, or which are naturally rich in available phosphoric acid.

DROUGHT FEEDING OF SHEEP.

FEEDING OF YOUNG LAMBS.

By THOMAS L. ARMSTRONG, Corona, Queensland.*

It will be remembered that in my article in the January issue I remarked that it was anticipated that the losses during the feeding period of the previous year would probably not exceed 6 per cent. This anticipation was more than realised, as is shown by the fact that for the period of twelve months, i.e., from May, 1928, to May, 1929, the total losses were under 5 per cent., and during that period 34,000 lambs were marked and reared (the number entered in the books being the actual number marked), so that it may, I think, be reasonably claimed that our feeding operations during last lear were a success.

The results of a small experiment in the feeding of young lambs which was carried out here in the early part of this year may be of interest to graziers generally.

In February last, owing to the imminent failure of the home pastures, it was found advisable to remove as many as possible of the breeding ewes to agistment areas, and as the ewes had only just finished a second lambing for the twelve months, the result of which was about 33 per cent., it was necessary that the dry ewes should be taken out of the various mobs in order to send them away.

During the mustering and handling necessary to accomplish this object lambs to the number of 511 lost their mothers, and it was decided to endeavour to save their lives by artificially feeding them. For this purpose they were collected in a motor lorry from wherever they happened to drop out of the various mobs and taken to one of the out-stations, where they were kept in two enclosures, each about 5 acres in extent, and fed in troughs on mixed fodder prepared as follows:—280 lb. ground maize; 150 lb. lucerne chaff; 440 lb. bran; 200 lb. linseed meal.

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* In the "Pastoral Review" for October (No. 10, Vol. XXXIX., p. 952).

These ingredients were thoroughly mixed together, and supplied in troughs, which were made from 18-inch strips of plain galvanised iron with rolled edges, which were suspended on parallel wires (which were run through the rolled edges) at a sufficient height so that the lambs could just reach into the bottom of the trough, as it was found by having the troughs as high as possible the danger of smothering through overcrowding was almost entirely done away with.

When the feeding was commenced the lambs ranged in age from two to eight weeks, being mostly of the younger age, and were in a more or less exhausted condition. For the first three weeks they were allowed a ration of 5 oz. of the mixed fodder per day. After the expiration of that period the allowance was increased to 7 oz. per day. After about the fourth week a ration of 2 oz. per day of lucerne hay was supplied to the lambs three times a week, and on the days when the hay was supplied the allowance of mixed fodder was reduced by 1 oz. per head. Fresh water was supplied to the lambs in the enclosures where they were kept. A lick composed of one part of coarse salt to three parts of Nauru phosphate was supplied to the lambs in separate troughs, and of this they partook regularly, though sparingly.

After being fed for eight weeks, during which period there were two wet days during which 5½ inches of rain fell, some of it fairly heavy, the lambs were turned at large on the natural pastures, which as a result of the abovementioned rain were then sufficient. The losses amongst these lambs for the whole period during which they were being fed amounted to eight.

About four weeks after being turned at large, these lambs, with 7,700 other lambs of the same drop which had not been taken from their mothers and which had from the time they were dropped (with the exception of a period of three weeks, when they and their mothers were supplied with artificial fodder) grazed on the natural pastures, were shorn. It was then found that the lambs which had been fed, although of a younger average age than those which had been with their mothers, cut more wool. The respective weights were not kept separate, but the difference was quite appreciable, amounting to probably 3 oz. per head, the average clip obtained from all the lambs being 1½ lb. per head.

Quite recently it became necessary to truck some 5,000 ewes, with their lambs, some 200 miles, and as the ewes had only finished lambing some few days before being trucked, some of the lambs lost their mothers in transit; these lambs were, after being untrucked at the completion of their train journey, carted by motor lorry for 30 miles and then fed in the same way as the 511 previously referred to, and although, as was inevitable considering their exhausted condition, some losses occurred, these ceased almost entirely after the lambs had been on the feed for a week, and they are all now thriving well, and as was the case with the first mob, the wool appears to be growing faster upon them than upon the balance of the lambs of the same mob, which have been with their mothers all the time. However, it is still too early to say definitely that such is the case.

The results obtained from these experiments would therefore appear to indicate that the nourishment received by the lamb from its mother's milk is productive of fat rather than wool.

I understand from Professor Brailsford Robertson, who is in charge of the Division of Animal Nutrition for the Council for Scientific and Industrial Research, that their investigations appear to emphasise the importance of the presence of cystine in rather large quantities in the food of sheep for wool production, and that whilst the milk of ewes is exceptionally deficient in cystine, this element is present in better quantities in the proteins of wheat bran, maize, and lucerne hay, so that it would appear that lambs fed on well-balanced rations including these fodders would grow more wool than those running with their mothers and drawing the greater portion of their sustenance from their mothers' milk.

Favourable Effect of Feeding on Growth of Wool.

One outstanding feature of our feeding operations during the past drought, or at least since we adopted the feeding on mixed fodder in troughs, has been the pleasing way in which the growth of wool continued throughout the period of feeding and its generally well-nourished condition. This has been so marked that upon handling the wool after being shorn it has been very difficult to believe that the sheep had been artificially fed, and that the wool was not grown under favourable natural conditions.

The Need for Scientific Research into Feeding Problems.

This is a factor which, it appears to me, must in future feeding operations be given the greatest consideration, and graziers, when faced with the necessity for feeding their flocks, must not only give very serious consideration to the question of what is the cheapest fodder upon which their sheep can be kept alive, but also to the question of what fodder will give the best ultimate return, and will produce the best results as far as the production of wool and lambs and the maintenance of the general health of the flock is concerned.

This is only one of the directions in which scientific investigation can and will benefit the grazing industry, and it is possible that the rendering of financial assistance to the furtherance of scientific investigation into the many problems affecting the pastoral industry is one of the best investments the grazier can make at the present time, and the one which is the most likely to be of benefit to the grazing industry in particular, and Australia as a whole. At the present time the future prosperity of Australia as a whole appears to a very great extent to be dependent upon the prosperity of the grazing industry, and the prosperity of that industry in the immediate future at least appears to depend entirely upon a reduction in the present outrageously high cost of production and an increase in the productiveness of our flocks, and in this latter direction it appears that we can confidently look to scientific research to assist us in the solving of many problems.

Too Much Salt in Licks.

It is quite evident that lick will be much more extensively used in Central and North Queensland in the future than was the case prior to the commencement of the present drought (I use the present tense advisedly in speaking of the drought, as over a very great proportion of the Central-West and Western districts the drought is as bad to-day as at any time during the past four years), and in this connection it appears to me that the prices of practically all proprietary licks at present on the market are unduly high, and also that their salt content is quite unnecessarily and possibly dangerously high.

There is to my mind not the slightest doubt but that the losses in sheep through the excessive consumption of salt during the present drought, and particularly during 1926, when a great many graziers were using licks and artificially feeding for the first time, and in many instances paying a ruinous price for their experience, were very great, as few graziers then realised that salt in excessive quantities is a deadly poison, and even where the sheep have not been actually killed by the excessive amount of salt consumed, in many instances a great deal of harm has been done to pregnant ewes as well as to those suckling lambs.

Scientific investigation points to the conclusion that the great deficiency in the natural pastures in both Central and Northern Queensland as stock fodder appears to be the absence of phosphoric acid in the necessary quantities to maintain the stock in a thriving condition, particularly during those periods following seasons of excessive rainfall, when the grass is both very rank and dry. It would therefore appear that the supply of phosphoric acid to the stock in comparatively large quantities should be one of the chief objects of any lick, and not the supply of excessive quantities of salt.

Linseed Meal to Make Licks Appetising.

We have for some considerable time past been experimenting with various salt licks, mostly prepared upon the place, and the chief difficulty with which we have had to contend has been to induce the sheep to consume the amount of phosphate which appears necessary to attain the best results, and for this reason it seems needful to add to the lick some element attractive to the sheep, and which will mix with the phosphate so thoroughly that the stock will be unable to pick it out by itself. The greatest success which has been achieved in this direction up to the present has been gained by the incorporation of a considerable quantity of linseed meal in the lick, and in this way a lick has been prepared which is sufficiently palatable to the sheep to induce them to consume relatively large quantities of phosphates. The formula in use for the preparation of this lick is as follows:—558 lb. ground rock phosphate; 184 lb. coarse salt; and 200 lb. linseed meal.

Even with this comparatively large proportion of linseed meal the sheep at first exhibit considerable reluctance to consume any reasonable quantity of the lick, and to overcome this reluctance the proportion of the linseed meal is increased by the addition of another 100 lb. to each mixing until the sheep have taken to the lick really well, after which the extra 100 lb. of linseed meal is discontinued.

A cheap and possibly effective substitute for the linseed meal might perhaps be a small quantity of molasses diluted with a sufficient quantity of water to enable it to be sprayed on to the salt and phosphate during the preparation of the lick, and our next experiment will probably be in this direction.

The cost of the above lick prepared on the place works out at about £14 10s. per ton with 200 lb. of linseed meal, or about £15 14s. with 300 lb. of meal. Without the meal, but with the addition of sufficient molasses to render the large quantity of phosphates palatable to the sheep, the cost would only be about £9 12s. per ton, whereas the cost of the various proprietary licks ranges from about £15 15s. to £17 10s. at the seaboard, and on top of that we have 467 miles of rail and 30 miles of road carriage to pay.

From the above it might appear rather strange that we have persevered with the use of linseed meal, considering the high cost of same, but the reason for this is that when artificial feeding was discontinued in March last we had a very large amount of this meal on our hands, and were unable to dispose of it except at a very considerable loss, which we did not feel disposed to do, hence the somewhat lavish use of it in the preparation of the lick without regard to its cost. We could increase the quantity of meal used and still have a cheaper article, and possibly a more effective one, than many of the proprietary licks.

The use of iodine in the preparation of licks may be necessary in certain districts, but it appears probable that where the sheep are consuming a reasonable quantity of crude salt this will sufficiently supplement the supply of iodine available for them.

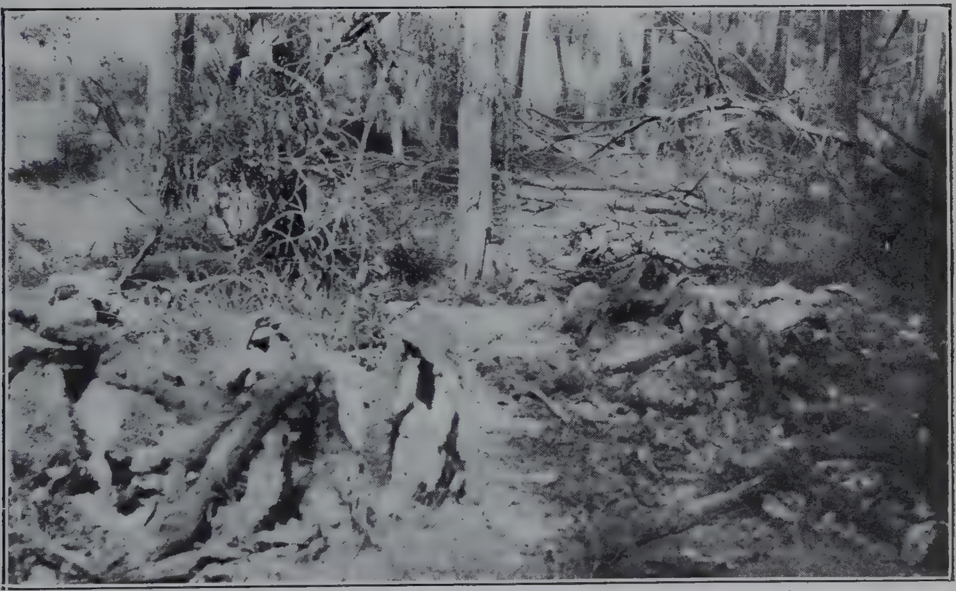

PLATE 32.—"AN ENEMY HATH DONE THIS!" ANOTHER GOOD KILL!

Cochineal, Chelinidea, and Cactoblastis, natural enemies of the pest, have been widely distributed throughout the pear area, and admittedly a 95 per cent. control has been exercised on the fruiting of prickly-pear. The most pessimistic landholder in the pear area therefore must agree that by mechanical means the Prickly-pear Commission has made it possible to maintain clear areas free from pear, and by the introduction of cactus-destroying insects it has controlled the further spread of pear. On the other hand, it would not be unduly optimistic to contend that by the use of mechanical and biological agencies the prickly-pear is gradually and surely being forced back, and should no disease or parasite adversely affect the cactus-destroying insects within the next few years, the pear problem in Queensland will be solved.

THE DEVELOPMENT OF THE SHORTHORN.

PROBLEMS OF BREEDERS.

By W. F. McLAREN, Naemoor Estates, Scotland.*

There are great breeds of beef cattle other than the Shorthorn—as, for instance, the Polled Aberdeen-Angus, which for quality of beef in unrivalled, except by the cross Aberdeen-Angus Shorthorn, the Hereford, and others, which have improved vastly during the last few decades, but I think I will stand uncontradicted when I state that no single breed of cattle is so universal, so cosmopolitan, as the Shorthorn. He stands, *par excellence*, as the ''grader-up'' of the world's race of cattle. He has the three big ''Q's'' in his pedigree—*Quantity, Quality,* and *Quick Growth.*

This evolution of the Shorthorn from the big, raw-boned late maturing and coarse animal of the eighteenth century. to the mellow, smooth-fleshed, early maturing and symmetrical animal of the twentieth century, has not been an accidental or casual evolution, owing nothing to the hand and mind of man. On the contrary, the reins of the evolution have been in the hands of great and far-seeing men, men with great hearts and great minds not untouched with genius, and the imprint of their work has been as permanent and as important, if not so spectacular, as that of better-known figures in the history of our civilisation.

Now nothing is further from my mind than to suggest that science should not have a connection, and a close connection, with successful evolution in cattle-breeding as in other industries; indeed I am all in favour of enlisting the co-operation of science into all and every department of agricultural activity, but I *do* want to suggest that without the master mind of the cattle-breeder, without the inherent and instinctive knowledge of that master mind in the ethics of his subject, science in itself would have had little hand in equipping the world with the improved race of cattle which is the only monument to our great master breeders.

Financial Returns.

Of the problems which confront the Shorthorn breeder their name is legion. First and foremost there is the problem of £ s. d. Prices at the moment are far from remunerative for purebred pedigreed Shorthorns, except in very exceptional cases, and it cannot be too generally impressed upon the general public and the farming community that the earnest and capable breeder of pedigreed stock must necessarily get a greater return than mere commercial price. His capital outlay and his running expenses are heavy, and he cannot carry on indefinitely without some concrete return and recompense for his services.

One hears a lot these days of the endeavour to improve the standard of store cattle; one hears of meetings and conferences to abolish the use of ''scrub'' bulls, but so long as we have the type of farmer or breeder who grudges to pay the extra pound or two which will procure him a decent bull when he can get his cows in calf by purchasing the worst ''scrub'' in the market, so long will we have the ''runt'' cattle which are the bane of the grazier's and feeder's life.

I do not see at the moment how we *can* abolish the ''scrub'' bull, but I do see how essential it is in the interest of the cattle population of the world why the buyer should be educated up or encouraged to use, not the ''scrub'' which he can pick up at the cheapest price, but the good pedigreed bull with a record behind him which he can purchase at just a little more. Stock breeders, and especially those in the pedigreed ranks, are, as a rule, men with an ingrained love of cattle, whose chief delight is to breed something which will do not only themselves and their herds, but the breed, credit, and whose enthusiasm is amply rewarded by an occasional outstanding production, but it must be admitted that a predilection on the part of the farmer to place his average, or nearly average, production on a par with the ordinary ''scrub'' is the reverse of encouraging or remunerative.

Problem of Pedigree.

For many years what I might call *paper* pedigree had a tremendous vogue among Shorthorn breeders. If a female was a ''Lavender,'' or a ''Princess Royal,'' or a ''Crocus,'' or a ''Duchess of Gloucester,'' or a ''Clipper,'' or an ''Augusta,'' or one or other of the few lines of families which seemed to have captured the popular fancy, she would sell at a great price no matter what were her intrinsic qualities, but breeders seemed to forget that a pedigree descends through the male side as well as the female side, and that what has originally been a ''Lavender'' line, in later generations had been crossed with all sorts and conditions of bulls, whose influence may have been good or bad, but was certainly unknown to most and unconsidered by many.

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* In the ''Pastoral Review'' for October (No. 10, Vol. XXXIX.).

There is, of course, quite a feasible explanation of this craze. It originated in some eminent and successful breeders of past generations sticking to one family name on the female side. If a cow was called "Butterfly," her daughter was "Butterfly 2nd," and her great-great-great-grand-daughter "Butterfly 50th," or something like that.

Females which had been in the hands of these eminent breeders, and had produced something outstanding, naturally acquired a reputation, and when they or their female descendants fell into the hands of other breeders they stuck to the family name, but unfortunately they could not, or did not, stick to the same class or type of stock bull, and often produced only inferior stock. Notwithstanding this a sort of glamour still surrounded the family name, but the vogue was the means of inflating prices and "boosting" rather middling cattle, to the prejudice of the breed and the disgust of inexperienced though enthusiastic breeders. Fortunately this state of affairs is quickly being remedied, and breeders are taking a much more sensible view in their choice of pedigree. Really great breeders of this country lay much greater stress upon good top crosses and general excellence in breeding than upon family name.

Problems of Type.

One cannot emphasise too much the importance of *type* in cattle-breeding, and especially in the breeding of beef Shorthorn cattle. The alpha and omega of breeding beef Shorthorns is to supply the largest possible portion of the world with its requirements in beef, and towards this end type in the general is of vastly greater importance than super-excellence in the particular. A herd of cows of one uniform type, with perhaps none of them very outstanding, makes a greater appeal to the true breeder than a herd with one or two cows of outstanding merit, the others being a mixture of all the types.

It is the type which tells in the long run. How often has one heard the remark, "Now, there is a good animal; he has lots of faults, but he is the *right type*"; and again, "he may be a good animal; he certainly hasn't many faults about him, but he is the "*wrong type.*" Take two animals, each representative of the quoted remarks, and which of the two finds most favour? Other things being equal, the latter may gain some fleeting and transient success in the show ring, but in the herd the former scores nine times out of ten.

It is quite possible for an animal to be at the head of a class at a show—and perhaps rightly so—and yet be inferior in intrinsic qualities to others in the class. Such an animal may be approaching the nearly perfection in almost every respect, and yet hardly conform to that perfect type which every true breeder has in his mind's eye, but can hardly define in actual words. It is a matter of instinct almost, and that is one reason why the inexperienced or inexpert breeder may do himself and his herd irreparable harm in securing at great cost an animal which has been a prominent show winner, and without taking into consideration the essential question of type.

To some extent the question of markets must govern the question of type. At the present time there are two distinct standards of type which command attention in the beef Shorthorn world. There is the short-legged, short-coupled, square-built animal, carrying a wealth of flesh, evenly distributed, on moderately fine bones. He, generally speaking, responds quickly to good feeding, develops early, and is generally recognised as the standard bullock of Britain, the Argentine, the United States, and Canada. In Australia and South Africa, more especially in Australia, the demand hitherto has in the main been something rather different. They have been breeding longer, rangier animals, the idea being that some length of leg was required to enable the animal to travel long distances to water.

I have, however, of recent years seen reports of some of the more important Australian shows and sales, and from these and the evidence of some of our home breeders who have visited the country it seems certain that the Scotch type of Shorthorn is rapidly gaining in favour and ousting the Australian type.

The ablest breeder in the world cannot, consistently, breed nothing but the best; he is bound at times to produce something which is below standard, and at this point I should like to enter a plea for the more drastic use of the knife in eliminating these outsiders from the ranks of pedigree breeding. It takes a strong mind in a breeder to see in the bull calf bred by himself from stock that he considers of merit—a rag of a beast which is not fit to procreate his own species, but the castration of this calf before he reaches the breeding age is the fastest and cheapest road to raise the standard of Shorthorn cattle and to fix permanently the true type and character of the breed.

The same principle of course applies on the female side, but its observance is the more important on the male side, where the bull is half the herd.

FRUIT AND VEGETABLE STORAGE.

By DR. LAURENCE P. McGUIRE,* Physiologist, Banana Research Station, Imperial College of Tropical Agriculture.

INTRODUCTION.

Generalisations regarding the optimum conditions for the cold storage of food products are, to say the least, difficult even for fruits or vegetables of a single genus. So much depends on the particular species or variety, the pre-storage conditions of nutrition (soil and climate), the stage of ripeness attained at the time of harvesting, the duration of the particular storage temperature, the amount of ventilation, the composition of storage atmosphere—humidity and concentration of carbon dioxide and volatile auto-toxins.

It must be borne in mind that up to the present experimental storage trials with vegetables have, for the most part, been confined to those grown in the temperate zones. In the case of vegetables cultivated in the tropics, it will be by experiment, and experiment alone, that consistent successful transport from season to season may be expected. The present paper, culled from current literature, is submitted in the hope that it will provide prospective shippers with the rudimentary knowledge with which experimental shipment may be commenced. Experience gained in the course of smaller preliminary trials will later justify large-scale operations.

It will be seen that investigators in different parts of the world recommend different optimum temperatures for the same fruit; in the absence of definite knowledge as to the variety, which is frequently not specified, this information appears at first sight to perplex, rather than assist. The references are given so that in the event of unsatisfactory transport at one temperature the other temperatures may be resorted to in turn.

Lastly, many fruits may be held successfully over compartively long periods at ordinary temperatures; as a general rule, the average storage expectancy of these fruits may be increased by storage at lower temperatures. Refrigeration is recommended during transport firstly to reduce, to a minimum, wastage due to the activities of putrefactive organisms and fungal growth generally, and secondly to allow, if necessary, of further storage at the port of destination in the event of a glut of the same commodity from a different country of origin (c.f. citrus on the English market from South Africa, Palestine, Azores, Canary Islands, &c.). The advantage under such circumstances of being able to delay senescence for a further period will be readily conceded. A careful study of Trade Commissioners' reports, based on first-hand information as to the trend of the market, would be helpful in this connection.

A.—VEGETABLES.

By way of introducing this aspect of the subject, reference will be made to the work at Norrköping, Sweden, of Lorenz Rasmusson[33], who carried out storage trials on a number of Swedish vegetables; after this, individual vegetables will be dealt with. He claims that in the case of Swedish Cauliflowers, Leeks, Red Cabbages, Brussel Sprouts, Artichokes, Jerusalem Artichokes, Beetroots, Horse-radish, Celery, Parsnips, Cabbages, Carrots, Sweet Marjoram, Thyme, Parsley, Dill and Turnip Cabbages, he has increased the length of storage life to an extent varying from four to nine months, and in the case of Salad, Spinach, and Tomatoes to two months. Krause[22] observes further that (1) Cauliflowers should be stored perfectly dry, otherwise they soon assume a greyish-white appearance and become covered with black sooty spots, which diminish their value considerably; (2) Artichokes, Celery, Parsnips, Beetroot, and Horse-radish kept best in dry sand† and in premises without light; (3) Marjolaine, Thyme, Fennel, and Parsley are inclined to lose their flavour in open crates. Zinc cans were found highly suitable.

All these vegetables were kept at a storage temperature of 32 to 33.5 deg. Fahr., and humidity 70 to 80 per cent. Generally speaking, vegetables should be packed in latticed crates in such a way as to ensure adequate ventilation, vitiated air being removed by periodically opening the storage doors for a short while.

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* In "Tropical Agriculture" (Trinidad B.W.I), October, Vol. VI., No. 10.

† For the purposes of transport dry packing material would be substituted for sand.

Tomatoes.

This commodity presents difficulties in storage, and advice as to the optima conditions of such storage must, of necessity, be guarded, owing to the considerable variation in keeping quality.

Rasmusson[33] (Norrköping) kept tomatoes for two months at 32 deg. Fahr.; Plank[31] and [23], of Karlsruhe, kept them for thirty-four days at the same temperature, remarking that on the fourth day after removal from storage deterioration due to mould formation was considerable.

According to D. B. Adam,[1] with tomatoes picked when three-quarters ripe and stored at 33 to 34 deg. Fahr. in ventilated chambers where humidity is relatively low, the average storage expectancy of seven to ten days may be lengthened to three weeks.

On the other hand, Barker,[3] of the Low Temperature Station, Cambridge, experimenting with both green and fully coloured tomatoes, is of opinion that the extension of the ripening and senescence of the tomato to any considerable extent by cold storage is not feasible. The experiments, which are by no means complete, suggest that the optimum storage temperature lies in the neighbourhood of 55 to 60 deg. Fahr. Storage at 34 deg. Fahr. might be recommended for the preservation of tomatoes as provisions for ships, where consumption would take place shortly after removal from storage.

H. C. Diehl[11] reports that experiments conducted with small lots of Acme, Globe, and Stone varieties gave results which indicated that such tomatoes were not injured when held for one day at 30 to 31 deg. Fahr. When subsequently stored at 50 deg. Fahr. for nine days they ripened very gradually, and if then held at room temperatures of about 70 deg. Fahr. they matured normally in five to seven days—a storage life of about fifteen days. (Tomatoes of the same stage of development, held at 32 deg. Fahr. for periods varying from fourteen to thirty days, failed to ripen, and quickly broke down at room temperatures.) If this procedure is adopted in transport, the preliminary cooling at 31 deg. Fahr. should be carried out in the Harbour pre-cooling station, after which the crates should be quickly conveyed to the boat chamber kept at a temperature of 50 deg. Fahr.

In harvesting tomatoes a small portion of the stem should be left on the fruit, and, furthermore, the use of individual wrappers for the fruit, which have been shown to retard the ripening process perceptibly, should be encouraged.

It should be clear from the foregoing that different varieties require different sets of conditions, which will be determined in the course of experiment only.

Onions and Garlic.

Experimental work at Norrköping[34] (Sweden) shows that at temperatures of about 30.5 deg. Fahr. onion tissue is altered by putrefaction, mould, and germination. On the other hand, very low temperatures—19.5 to 23 deg. Fahr.—kills the tissue and coagulates the albumen, which, after thawing, remains denatured. At 27 deg. Fahr. the tissue remains unaltered, and on removal to higher temperatures is similar to that of fresh onion, chemical analyses supporting the view. Cultivated Garlic may be kept at 21 deg. Fahr. without danger; nevertheless 27 deg. Fahr. is quite adequate for satisfactory preservation. V. R. Boswell[5] studied the behaviour of onions during, and subsequent to, storage at 32, 40, and 50 deg. Fahr., and found the lowest temperature most suitable. Furthermore, onion plants from the bulbs stored for eight months at 32 deg. Fahr. showed extraordinarily vigorous leaf growth.

For the purposes of a short voyage of fourteen days Onions, Garlic, Leeks, and possibly other members of the same family—viz., Spring Onions and Eschalots—could be safely carried at 32 deg. Fahr.

Potatoes.

Keeping potatoes at a temperature of 32 deg. Fahr for long periods (four months) helps sugar aggregation, since at this temperature respiration is slower than saccharification. Even at 36.5 deg. Fahr. sugar aggregation is noticeable in the slightly sweetened taste if the potato has been kept for any length of time at that temperature. From this point of view storage at 37 to 41 deg. Fahr. is advisable.[40]

Stuart *et al.*[37] observe that the range for complete dormancy of bulk-stored potatoes is between 36 and 40 deg. Fahr., and for normal potato storage a room temperature of 37 deg. Fahr. is apparently sufficiently low to prevent germination, at the same time insuring as low a transpiration and respiration loss as is desirable.

Storage of potatoes (1) at 35 to 37 deg. Fahr. eliminates storage rots[13] among seed potatoes, and (2) at 36 to 40 deg. Fahr. for fifteen days kills the caterpillars, pupæ, and eggs of the potato moth (*Phthorimœa operculleia* Zell.). It is further to be noted that the germinating power of seed potatoes kept at cold temperatures for as long as six months is not impaired at all, such seeds giving rise to a more uniform crop of sturdier plants. This view is supported by Etheridge[12] and co-workers of the Missouri Station.

As a result of his study of the relation between the storage temperature and the incidence and spread of storage dry-rot, Morris[27] advises holding potatoes in well-ventilated rooms maintained at 35 to 40 deg. Fahr.

Kimbrough,[21] having measured the initial rate of respiration when potatoes are removed from storage at different temperatures, found 40 deg. Fahr. to be the most suitable.

The concensus of opinion, then, favours storing potatoes at approximately 40 deg. Fahr.

Sweet Potatoes.

J. I. Lauritzen,[24] working on the temperature and humidity relation of black rot in sweet potatoes in storage, claims that at temperatures of 43 to 50 deg. Fahr. and humidity below 90 per cent. it is believed possible to eliminate, almost entirely, the incidence and spread of this disease. Thompson[38] reports that when sweet potatoes are thoroughly dried or cured the temperature for long storage should be maintained at as near 55 deg. Fahr. as possible, Crider and Albert[7] advancing a similar recommendation. Sweet potatoes, then, should carry favourably at 50 to 55 deg. Fahr.

Carrots.

Carrots were kept twenty-two weeks at 32 to 35 deg. Fahr and 39 to 40 deg. Fahr., losing 7 per cent. and 26 per cent. of their weight respectively. Hasselbring[15] observes that the hydrolysis of sucrose into reducing sugars was more rapid at the higher temperature. As the flavour is correlated with the sucrose content the lower temperature is recommended—viz., 32 to 35 deg. Fahr. Lauritzen[25] has shown that at such temperatures infection and decay, due to black-rot disease, are reduced to a minimum.

Celery.

Care should be taken to pack in dry material[22] and to ensure ample ventilation. A temperature of 31.5 to 32 deg. Fahr. has been found most suitable.[42]

Asparagus.

Plank's[31] investigations at the Institute of Refrigeration, Karlsruhe, indicate that asparagus in baskets may be kept approximately three to four weeks at a temperature of 32 to 35.5 deg. Fahr. and humidity 80 per cent. Bisson, Jones, and Robbins[4] recommend that asparagus should be stored as quickly as possible after harvesting in chambers at slightly above 32 deg. Fahr.

French Beans.

Scarlet runner beans[23] were held with favourable results in loose heaps for three weeks at a temperature of 32 to 38 deg. Fahr and humidity 85 per cent. They lost 20 per cent. of their weight in this period of storage.

Parsnips.

Boswell,[6] studying the parsnip from the point of view of changes in quality and chemical composition during storage, found that roots may be rapidly brought to a state of high table quality by storage at 32 to 34 deg. Fahr, the hydrolysis of starch and other polysaccharides, with consequent accumulation of sucrose, proceeding much more rapidly than at ordinary temperatures. The commercial value of this product is enhanced by holding at a temperature of 32 to 34 deg. Fahr. for three weeks.

Squashes.

Squashes may be conveniently kept for long periods at 50 to 55 deg. Fahr.; at temperatures higher than this squashes undergo a great loss of weight. Cummings and Jenkins[8] point out that squashes kept at 74 deg. Fahr lost 63 per cent. of their weight in five months, while a comparable lot held at 55 deg. Fahr. for the same period lost only 20.1 per cent. In a storage test of squashes and pumpkins the mammoth cheese pumpkin kept in good condition for seventeen months. A storage temperature of 50 to 55 deg. Fahr. seems adequate.

Topepos.

Topepos have been kept unrefrigerated, and only towards the end of a period of eighteen days was a slight inclination to shrivelling noticeable. On maturing, the orange colour turned to deep red. Experimental transport might be commenced at temperatures in the neighbourhood of 50 deg. Fahr.

B.—FRUITS.

Citrus Fruits.

Citrus fruits, generally speaking, should present no difficulty to the shipper in the matter of a fourteen-day journey. Ocean transportation studies indicate that if pre-cooled to 50 deg. Fahr. citrus fruits may be shipped from Porto Rico[26] to New York in the ventilated holds of non-refrigerated ships, the temperature not rising much above 60 deg. Fahr. Citrus fruits (Grape-fruit, Oranges, Tangerines, Mandarins, &c.) are exported from South Africa at 38 to 40 deg. Fahr.

Grape-Fruit.

Hawkins and Barger[16] have shown that cold storage of grape-fruit is commercially practicable. Records show that for fruit to be held for six weeks in storage, pre-curing by exposure to from 70 to 75 deg. Fahr. at a humidity of 65 per cent., or by exposure to the gases generated in the incomplete combustion of kerosene stoves, reduced skin-pitting injury. The latter treatment is superior in being beneficial also in the loosening of the stem buttons, the absence of which tended to reduce disease infection in the fruit. These authors further point out that fruit picked early in the season can be readily stored for six weeks to two months at 32 deg. Fahr.

Oranges.

The investigations of D. B. Adam[2] with Washington Navel and Valencia oranges indicated that 34 deg. Fahr. is the most favourable storage temperature, taking into consideration both keeping quality and freedom from spotting. G. B. Tindale[39] considers 37 deg. Fahr. to be the most suitable temperature for Valencia late oranges, as a fluctuation of three degrees either way would not be attended with harmful results.

Lemons.

As a result of curing and storage tests of lemons at Gosford, W. B. Stokes[36] concludes that lemons harvested green may be held successfully in a well-protected storeroom for several months at a temperature of 70 deg. Fahr. or below, and relative humidity 80 to 85 per cent. Read[35] further supports the view that with careful handling, picking, curing, &c., lemons may be kept in ordinary cool storage for six months in excellent condition. For the purposes of short transport, then, refrigeration, in the ordinary sense, seems unnecessary.

Limes.

When picked fully grown but still quite green limes last comparatively well in ordinary cool storage—shipments of this fruit from Trinidad at temperatures in the neighbourhood of 45 deg. Fahr. have, on arrival at market, been favourably commented upon.

At temperatures of approximately 38 to 40 deg. Fahr.—the South African practice—or more widely 35 to 45 deg. Fahr.—the transport of citrus fruits should prove successful.

Mangoes.

Higgins and Punzalan,[19] from experimental storage of varieties of mangoes at temperatures of 36, 40, and 50 deg. Fahr., state that sound, green, but fully matured mangoes may be kept in satisfactory condition for eighteen to thirty-days at 36 deg. Fahr.; at 40 deg. Fahr. fungus injury was prevalent, and at 50 deg. Fahr. shrivelling and decay soon occurred.

Pineapples.

While individual cases of pineapples sent home in the ship's provision room have reached their destination in good condition, this is by no means the rule. Experience has shown clearly that pineapples cannot endure low temperatures, on removal from which they rapidly break down—a view supported by Davies.[9] Studies at the Porto Rico Station[26] show that exposure to 35 to 40 deg. Fahr. will stop maturity changes considerably, whether fruits are green or mature—storage at this temperature for six days did not interfere with proper ripening, subsequent to removal from the store. Transport at 43 to 45 deg. Fahr., with adequate ventilation, is recommended.

Grapes.

Malaga (South African) grapes, harvested in late March and early April and packed in boxes with sulphite tissue paper and wood-wool, were kept at 32 to 33 deg. Fahr. for five months in excellent condition. De Castella[10] further confirms the view that 33 deg. Fahr. is the most suitable temperature for the transport of grapes.

Melons and Cantaloups.

Uurbina,[41] in an article on the transport of melons from Chili, is of the opinion that 32 to 34 deg. Fahr. is the best temperature for the preservation of melons in excellent condition. He stresses the importance of (1) careful handling to obviate mechanical injury, and (2) adequate ventilation, and recommends that the storage compartments be loaded to two-thirds of their height. With suitable "dunnage" between crates and adequate circulation of the air, this precaution may reasonably be omitted. For short journeys Californian cantaloups are carried at 40 deg. Fahr.

Pomegranates.

On account of the texture of the skin, this fruit will withstand a deal of abuse. After harvesting, the fruits, which should be clipped rather than pulled, will keep for months if stored in a cool, dry place. Although the bright lustre of the fruit is lost and the fruit shrivels somewhat, the flavour is not impaired in any way. Hodgson[20] further observes: "On account of the common habit of splitting, the fruit of most varieties must be picked before fully mature. Fortunately, the pomegranate is one of those fruits which, after reaching a degree of maturity, continues to ripen in cold storage, where it will keep in excellent condition for five to six months. Not only does it ripen, but the quality is improved, the flavour becoming richer and more vinous."

This commodity, then, should present no difficulty to the shipper.

Papaws.

Careful packing is absolutely essential in the transport of papaws. J. E. Higgins,[18] of the Hawaii Experimental Station, reports:—"The use of crimped strawboard as an exterior wrapper to go about each fruit in addition to the paper wrapper (glazed) is recommended. This provides a very valuable elastic cushion, against which the fruit rests, and which saves the fruit much bruising. . . . Refrigeration can be recommended for the shipping of papaias. No deterioration in the flavour of the fruit could be detected after it had been in refrigeration throughout the voyage to San Francisco, nor were there any other evil effects apparent."

An experimental shipment at 38 to 40 deg. Fahr. of a few cases from South Africa to the London market (about twenty-four days altogether in transit) suggests that the West Indian papaws, in view of their proximity to the market, might be exported with success at this temperature.

Avocado Pears.

Overholser[29] reports as follows:—"40 deg. Fahr. proved to be satisfactory for all varieties tested, except the Fuerte, which required 45 deg. Fahr. to prevent blackening of the skin. It was found that quick storage after harvesting, and care in handling, aided in keeping the fruits in satisfactory condition. Fruits picked just before the commencement of softening kept best and attained excellent quality. In proper storage the Dickinson, Royal, Taft, and Queen varieties kept for approximately two months; Spinks, Sharpless, and Challenge, five to six weeks; Rey Fuerte and Kist, for about four week." Several varieties[28] gave indication that they might be kept without injury at a temperature of 32 to 35.6 deg. Fahr.

Litchis.

At the Hawaii Experiment Station[17] it was found that "Refrigeration, where it is available, furnishes the best means of preserving the litchi for a limited period in its natural state." Unfortunately, no actual temperatures are given, but it is to be remembered that the fresh fruits keep quite well at ordinary temperature for two to three weeks without deteriorating in flavour, although the attractive red colour of the fruit is lost. Refrigerated fruit, on the other hand, showed no loss in colour or flavour during storage for a fortnight. Experimental shipment might be commenced with temperatures in the neighbourhood of 40 to 45 deg. Fahr.

Jujubes (*Zizyphus* spp).

According to Popenoe[32] no weather appears too hot for its cultivation, and it has withstood, without perceptible injury, a temperature as low as 13 deg. Fahr. In storage trials conducted by Overholse[30] jujubes have been kept at 32 deg. Fahr. in open containers for forty-five days, and remained marketable for five days after removal. The chief difficulty encountered was the cracking of the skin and wilting. In closed containers, at 32 deg. Fahr., cracking and wilting were lessened, and the fruits kept for eighty-five days.

The Kaki or Japanese Persimmon.

According to storage trials at the California Experimental Station,[30] Persimmons (Japanese) were held at a temperature of 32 deg. Fahr. for two months—upon removal from storage they remained marketable for a period of eight days.

Nuts.

Walnuts, almonds, and pecans have been held, both shelled and unshelled, for periods of four years in cold storage, with only slight deterioration in the flavour. Storage at 32 deg. Fahr. gave the best results, the depredations of worms[22]—a major evil of these commodities in storage—being successfully held in check.

Bananas.

Bananas of the Gros Michel variety are carried in well-ventilated holds at a temperature of 53 to 54 deg. Fahr. On arrival at their destination they are conveyed to ripening rooms of high humidity (90 per cent.) and a temperature between 70 to 80 deg. Fahr., according to the rapidity with which they are to be ripened to meet the market demand for ripe fruit.

Figs.

According to the "Revista Commerciale Itala-Americana," a new method of treatment[43] is being applied—the figs are immersed twice in a preparation with a paraffin basis (for large quantities a rolling carpet machine is used). In this way a rigid envelope is formed around the fruit, which prevents loss of aroma by evaporation. The paraffin substance is quite inoffensive and is removed with the peel—there seems, therefore, no objection from the hygienic point of view. In this way a delicate and highly perishable product may be put on the market in excellent condition, despite long journeys.

Good results have been obtained with figs stored at 32 to 34 deg. Fahr.

CONCLUDING OBSERVATIONS.

I.—The storage temperature and the commercial storage life at these temperatures are given for a number of fruits and vegetables either indigenous to, or which may be grown in, the tropics.

II. The maximum and minimum temperatures for safe transport, which would be valuable to prospective shippers, are given in a few instances only, as, unfortunately, the shipment of vegetable food products of tropical origin over long distances has received comparatively little attention; accounts of storage trials give, as a general rule, little more than the commercial storage life of a commodity at one particular temperature; in transport, the storage chambers should be maintained at as near that temperature as possible. Experiment will later define the margin of safety.

III.—With cargoes which are to be carried at low temperatures (32 to 40 deg. Fahr.), pre-cooling of the fruit at the harbour cold store, immediately prior to shipment, is very strongly recommended.

IV.—In storage compartments, particularly where refrigeration is effected by exposure to cold brine pipes (stagnant cold air as opposed to the cold air blast system), the use of "dunnage"—thin strips of wood nailed on the crates—to allow of the passage of cold currents between successive tiers of crates has proved decidedly advantageous.

V.—Care in harvesting and packing, to avoid mechanical injury, is essential to consistent successful shipment. The determination of the optimum conditions of transport, by the often slow process of elimination of unfavourable conditions, has frequently been delayed unnecessarily, through failure to observe carefully this condition; for the purpose of experiment the use of material, other than carefully picked, unbruised, thoroughly sound specimens, cannot be deprecated too strongly.

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CLIMATOLOGICAL TABLE—NOVEMBER, 1929.

SUPPLIED BY THE COMMONWEALTH OF AUSTRALIA, METEOROLOGICAL BUREAU, BRISBANE.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·88	88	76	95	27	65	5	106	3
Herberton	..	87	63	99	6	48	4	505	6
Rockhampton	29·88	91	69	102	4	62	3	315	7
Brisbane	29·88	84	64	100	25	54	8	125	10
Darling Downs.									
Dalby	29·85	89	61	104	24	49	7, 27	215	4
Stanthorpe	..	78	51	93	24	34	7	265	9
Toowoomba	..	82	56	96	24	45	7	199	7
Mid-interior.									
Georgetown	29·82	99	72	107	6	58	4	110	5
Longreach	29·79	99	70	112	24	63	28, 2	69	5
Mitchell	29·84	90	62	105	24	46	7	201	4
Western.									
Burketown	29·82	98	76	105	5, 28	68	4	82	2
Boulia	29·80	102	64	113	24	57	28	61	2
Thargomindah	29·81	91	67	106	3	59	28, 6, 7	115	3

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1929, AND 1928, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of Years' Records.	Nov., 1929.	Nov., 1928.
North Coast.	In.		In.	In.
Atherton	2·07	28	4·22	5·54
Cairns	3·91	47	0·87	7·11
Cardwell	4·06	57	2·58	9·43
Cooktown	2·63	53	1·06	4·39
Herberton	2·50	42	5·05	5·15
Ingham	3·71	37	2·05	13·89
Innisfail	6·13	48	3·26	13·68
Mossman	3·99	16	5·04	13·51
Townsville	1·82	58	0·25	3·59
Central Coast.				
Ayr	1·70	42	0·20	3·96
Bowen	1·31	58	0	3·49
Charters Towers ..	1·49	47	0·99	5·04
Mackay	2·98	58	0·51	10·75
Proserpine	2·87	26	0·31	6·53
St. Lawrence.. ..	2·28	58	0·64	5·29
South Coast.				
Biggenden	2·66	30	5·15	2·03
Bundaberg	2·50	46	2·38	1·49
Brisbane	3·71	78	1·25	2·90
Caboolture	3·34	42	1·67	1·73
Childers	2·65	34	3·93	1·51
Crohamhurst ..	4·28	36	3·44	0·91
Esk	3·20	42	2·32	1·68
Gayndah	2·82	58	2·52	1·93
Gympie	3·11	59	2·49	1·38
Kilkivan	2·52	50	3·32	1·38
Maryborough ..	3·06	57	4·26	0·91
South Coast—continued :	In.		In.	In.
Nambour	3·77	33	2·52	0·64
Nanango	2·62	47	0·92	3·22
Rockhampton ..	2·17	42	3·15	1·70
Woodford	3·17	42	2·30	1·78
Darling Downs.				
Dalby	2·66	59	2·15	2·70
Emu Vale	2·62	33	1·74	1·09
Jimbour	2·37	41	1·29	3·99
Miles	2·39	44	0·73	2·25
Stanthorpe	2·72	56	2·65	1·73
Toowoomba ..	3·24	57	1·99	1·63
Warwick	2·59	64	1·48	2·02
Maranoa.				
Roma	2·06	55	1·33	1·52
State Farms, &c.				
Bungeworgorai ..	1·99	15	1·41	1·06
Gatton College ..	2·76	30	1·70	1·77
Gindie	2·07	30	0·60	2·65
Hermitage	2·63	23	1·16	1·30
Kairi	2·11	15	2·41	6·14
Mackay Sugar Experiment Station ..	2·66	32	0·90	6·87
Warren	2·96	14	..	4·17

GEORGE G. BOND, Divisional Meteorologist

RURAL LIFE IN OTHER LANDS—VIII.

By the EDITOR.*

LAND TENURE.

BEFORE continuing our consideration of some phases of rural life in other lands I should like to say something on forms of land tenure that exist and have a great influence on farming life in some of the countries of Europe, and of which one saw many examples in actual application.

The Scandinavian countries, and more particularly Denmark, show the most satisfactory results from their system of land tenure than any other of the older countries from what I was able to gather and as far as my knowledge goes.

Of course, we are now dealing with countries of well-established primary industries, thickly populated, with markets at every gate, and guided by many centuries of experience and tradition. And, though it is always worth while studying the systems whether of land tenure or of farming practice in the older countries, we remain conscious of the fact that, under an entirely different set of conditions as exist in Australia, they might not be so successful.

Systems of Land Occupation.

Before going into the details of the more or less identical Danish or Swedish systems and methods, and the results produced from them, it would be as well, perhaps, to survey rapidly the different systems of land occupation which have been tried, and still survive in one form or another, since man emerged from his wandering tribal days. I am using the word tenure in its general sense, with no legal or technical limitation. For example, where the majority of farmers own their farms, the system of tenure is occupying ownership. Where they rent the farms they occupy, they do so under the tenancy system, whether they rent their land from an individual or from the State. Where, as in some parts of Europe, the commune or local authority owns the land and allots it to its members, we have the communal system. And when the farmers, instead of working individual holdings, cultivate the soil collectively, then we have the communistic system of tenure. There are very few examples of the communistic system, however, and none that I know or have read of, outside religious orders, are very successful. Where a country or State owns the land on behalf of its people, we have a system of State ownership. The system of ownership by the commune and State ownership are closely related, but there is a vast difference between them and private occupying ownership.

Evolution of Land Ownership.

A study of the history and evolution of civilisation tells us that at one time, in the earliest ages, there was no ownership of land. Primitive man did not own land either collectively or individually, and probably did not want to own it. To him his country was nothing more than a hunting-ground, more or less happy according to the abundance of game and the risks he had to take in getting it.

Then, in the next stage, our forefathers in the long ago thought it would be a good idea to domesticate some of the animals they spent most of their time in hunting. They found it more convenient and certain to keep to-morrow's breakfast or next week's supplies tied up near their gunyas or tethered to a sapling just outside their cave, just as our own aboriginals in some parts of Australia are said to keep their next day's dinner—a crocodile, perhaps—tied up under the house. Sheep in a station ration paddock to-day is evidence of the survival of this custom.

Then followed the tribal system under which a tribe had a more or less right to certain areas over which its members hunted, and on which their stock grazed. Any encroachment by another tribe on their selection was promptly and forcibly resisted. This system survives to-day in Australia among aboriginal tribes who are still more or less beyond the range of European settlement.

As civilisation advanced, not only did these tribal areas become more clearly defined, but portions were allotted gradually to individual members of the tribe to cultivate. Land may have been cultivated collectively in some cases, but there is little evidence of this, and, in any case, that system was soon superseded by individual cultivation of plots allotted by the tribe or commune. As civilisation further developed, the desire of the individual to own the land he tilled became stronger and stronger, until to-day we see in all of the older civilised countries most of the land in the hands of private individuals.

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* In a Radio Talk through 4QG.

Security of Tenure a Natural Desire.

To own the land one cultivates, or to have at least absolute security of tenure, seems to be a very general human instinct. We are all familiar with the evils that have grown up around the monopoly of land; we have seen, as in England during the past century, the control of vast areas of country concentrated in the hands of comparatively few people. So the tenancy system grew, and we know the efforts of British statesmen in recent times to mitigate some of the obvious evils that grew out of that system, and which still present a perplexing problem. In comparison, I should say the Scandinavian system of occupying ownership, as against the British system (changed somewhat, admittedly, in later years) of tenant farmers, is far better.

On the other hand, France gives examples of the ridiculous extremes to which the principle of occupying ownership can be carried. Small farming properties there have been so divided and subdivided until, in many cases, an unworkable unit is arrived at. In one extreme case a farmer (one could hardly call him a farmer on such an area) owned a strip of land, little broader than a single furrow, just a yard wide and half a mile long.

A Danish Example.

In Denmark these evils have been remedied or avoided; in districts where small holdings are the rule, no one individual is allowed to buy out his neighbours and turn an aggregation of small areas into one big farm. The influence of the old system of primogeniture—that is the succession to the land title by the first-born or eldest son—has also been against excessive subdivision.

About eighty years ago the land conditions in Denmark were similar to the rural conditions in other countries of Europe to-day, and the Danes discovered that there was something "rotten in the State of Denmark." Eighty years ago 88 per cent. of the occupiers of Danish farms were tenants of great landowners, and only 12 per cent. of the farmers owned the land they cultivated. The Government of the day realising that the tenancy system was against the best development of the land, and that it did not encourage high standards of cultivation, set about increasing the number of occupying owners. In this work the Government, oddly enough, received every assistance from the big landed proprietors, who saw the business in the idea from a national point of view. All sections worked to raise the standards of agriculture and the status of the agriculturist. To-day only twelve out of every hundred farmers in Denmark are tenants of a landlord. The other eighty-eight own their own land. And the result of this policy, carried out more scientifically and wisely than perhaps in any other country, is that we see in Denmack to-day a nation with a highly developed country life and prosperous rural industries. The country people there, too, enjoy a very high standard of rural education, and consequently there is no difficulty in securing united co-operative effort to still further develop agriculture in every direction

A Balance between Individualism and Collectivism.

In Denmark one sees the most perfect balance between individualism and collectivism, for the Dane as an individual is an active, virile, independent man, working on his own and for himself; yet he is sufficiently educated to understand that at a certain point collective action is necessary—not only for the good of the community, but to secure the full result of his efforts as an individual. In this attitude of mind, in the results of the balance of individualism and collectivism there are, if I may so suggest, some sound lessons for the Queensland farmer.

There is no standing still, or marking time, or waiting for the weather to break, or until after Christmas, about the Danish people. The area of the land under cultivation is being constantly and successfully extended; bog land has been drained and turned into rich productive soil; light sandy soil has been built up gradually and turned into excellent easily-worked land for small holdings. Yields have steadily increased, and the scientist is yoked up in double harness with the field worker, and with it all the Danish farmer has been able to provide a sound business organisation at the selling end of every crop.

Denmark remains the only example in the world of a country in which it is possible—and it has been done—for a working man to found an agricultural college.

The resourcefulness of the Danes is illustrated in another way. During the war her coal supplies from England on which she depended for light and fuel were cut off. To meet this situation the agricultural co-operative societies erected electrical plants to provide power, heat, and light to carry on their essential industries.

The whole history of Denmark is one of progress, and, in my opinion, the primary cause of that progress was the substitution of a system of occupying ownership for occupying tenancy.

SOOTY OR PITCHY MANGE IN PIGS.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

Note his been made on several occasions recently of a form of skin disease in pigs, technically referred to as Sooty or Pitchy Mange and which, to the eye of the layman, resembles the condition illustrated in Plate 33 of a pig suffering from Sarcoptic Scab, another type of skin disease, much more serious in its effect on the animal and much more difficult to eradicate. Sooty or Pitchy Mange, according to Mr. C. J. Pound, Government Bacteriologist in Queensland, is frequently a symptom of internal disease of such a nature as to cause general ill-health and result in the skin and hair becoming hard, dry, scurfy, and altogether unhealthy.

It is impossible with the naked eye to definitely determine the real cause of these skin diseases, for the parasites responsible for these troubles are so minute. This disease is differentiated from true mange by the very intense itching, but with certainty only by the discovery of the parasites which is usually easy upon microscopic examination.

The diseases are sufficiently important and their effect on the animals so serious, that no effort should be spared to have the cause of an outbreak investigated, and in this connection farmers whose pigs are affected with skin diseases are invited to communicate with officers of the Department of Agriculture and Stock with a view to having the condition investigated.

The following treatment is likely to prove useful in both forms of Sooty or Pitchy Mange (i.e., where due either to parasitic infection or to internal trouble).

Cleanse the affected parts thoroughly by washing with warm, soapy water, to which some disinfectant solution has been added; then dry with a soft cloth and dress with a mixture composed of—

Raw linseed oil	1 quart.
Hycol disinfectant	1 teaspoonful.
Flowers of sulphur	4 oz.

Mix the flowers of sulphur with a small quantity of the oil first, then add balance of the oil and finally add the Hycol disinfectant, stirring the latter well into the mixture before applying to the skin. Repeat the application for several days and keep affected stock isolated from healthy animals and under improved hygienic conditions, feeding liberally on soft, nourishing foods, allowing ample supplies of clean drinking water, greenstuff, and mineral matters. The pens or yards in which the affected animals have been housed or fed should be thoroughly cleaned up and all rubbish and litter burned. The woodwork should be limewashed and/or disinfected, and kept clean and free from accumulations of mud and filth.

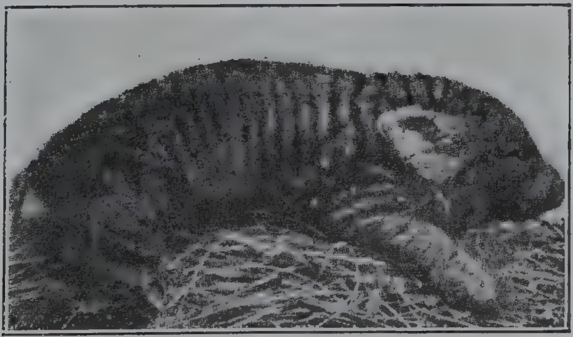

PLATE 33.—SARCOPTIC SCAB IN THE PIG.

A disease of the skin causing the animal intense pain and irritation and affecting growth and appearance to such an extent as to render affected stock unmarketable and distinctly unprofitable. Pigs affected with Sooty or Pitchy Mange have a striking resemblance to the pig affected with Sarcoptic Scab.

OTHER FORMS OF MANGE IN PIGS.

*Mange Mites.

Mites belonging to two genera cause mange in swine, *Sarcoptes scabiei suis* and *Demodex folliculorum suis*. These parasites spend their entire life on the host and live on the blood and tissues of the animal they attack.

The body of the Sarcoptic mite is rounded above and flat below. Its size is about one-fiftieth to one-sixtieth of an inch. The thoracic and abdominal regions are more or less united, the epidermis is transversely striated, and bristles are present on the back. The mandibles are shaped like a crab's claw. They possess four pairs of short thick legs. In the male the hind legs are equal in length, suckers being present on the first two pairs of legs. The males are smaller than the females. If the mites are placed on a dark background they are just visible to the naked eye, but a lens or the low power of a microscope is necessary for identification.

The female mange mites burrow into the skin and lay eggs in the burrows. In from three to ten days the eggs hatch and the young mites, after moulting several times, begin to lay eggs in ten or twelve days. By this time they are near the surface, due to the normal shedding of the epidermis and to the rubbing of the infested animal. The young mites then make fresh burrows in the under surface of the skin and repeat the process. The irritation is severe, and the sensitive areas become inflamed and swollen. The swollen areas are larger than pinhads and have dried serum adhering to them. As the number of mange mites increase the raised areas become closer together, the hairs fall out, scabs are formed which rub off, and the serum oozes out and often a raw surface is left. Later the skin is corrugated, and in chronic cases wrinkles are left. If badly affected the animals become emanciated, and if left untreated will die.

Diagnosis consists in finding the mites by means of scraping the affected parts of the skin with a blunt-edged knife and examining the scrapings under a magnifying glass or by treating the scrapings with a hot 10 per cent. solution of caustic potash and examining under a microscope.

Sarcoptic mange is contagious and is generally spread directly by contact of one infested animal with another. Man may become infected and extreme irritation results for about thirty days, but the mites will not live much longer than that on another host. Crowding and unclean conditions predispose to the rapid spread of the disease. Weak, unthrifty animals are more prone to mange than healthy ones, and pigs fed upon a vitamin-deficient ration are very apt to suffer from this and many other diseases. The mites do not multiply after leaving an animal, but remain alive for two or three weeks or longer, and their eggs can survive for nearly as long under suitable conditions.

Pigs suffering from Sarcoptic mange should be treated with (1) crude petroleum, (2) cotton-seed oil and kerosene in equal parts, or (3) kerosene and lard, 1 half-pint of the oil to 1 lb. of the lard. These preparations may be applied with a brush or cloth and rubbed well in. Freshly treated pigs should not be allowed to become chilled, should not be moved rapidly, or subjected to strong sunshine. All litter should be destroyed by burning and the sty thoroughly disinfected before using for healthy pigs.

*Demodectic or Follicular Mange.

This is caused by a very small mite, *Demodex folliculorum suis*. It is wormlike in shape; the cephalo-thorax is followed by a transversely striated abdomen which gradually tapers towards the end. It is about one-hundredth of an inch in length; the male is smaller than the female. These parasites are found in the hair follicles and sebaceous glands of the skin, where the whole of the life cycle is completed. The parts of the pig's body most favoured by the parasites are the under parts of the head, neck, and abdomen and inside the thighs. The lesions often commence round the snout and the eyes and spread to the surrounding parts. The parasites are generally found in clusters and cause pustules, which often run together and form cavities and scales. If badly affected, pigs will become unthrifty, and septic sores and scabs on the animal appear and give an opportunity for bacteria to gain an entrance to the skin. The condition is not a very common one in swine, and is more serious in the dog; other animals affected may be cattle and goats. The best method of treatment for pigs affected by these parasites is the regular application of crude petroleum to the affected parts.

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*From an article on "Some External Parasites of Swine," by Mr. K. D. Downham in the "Pig Breeders' Annual," 1929-30, and reproduced also in "Q.A.J." October, 1929.

THE BATTLE OF THE BREEDS.

E. J. SHELTON, Senior Instructor in Pig Raising.*

Conditions in the live stock world in these twentieth century days are vastly different to those common during the eighteenth century and during earlier years when improvement in live stock really began, and when our forefathers took up in real earnest the domestication, selection, breeding, and development of the several types of live stock they were able to secure and control on a commercial basis.

Nowadays, it is quite a difficult contract to differentiate between the various breeds as to which is actually the most profitable, and quite as difficult to determine whether there is any one breed so much better than the others as to warrant it receiving special consideration when the question of selection of a breed is under review.

We speak of the battle of the breeds then as indicating the struggle for supremacy in which the various breeds are engaged. In the pig world in Australia we have nine different pure breeds of pigs, all of which are catered for and included in the herd-books of the Australian Stud Pig Breeders' Society.

These breeds are known by names which largely indicate their place of origin or the country or State in which they were originally developed and popularised, and comprise two principal groups, first the British breeds, and secondly those originating in America and coming to us through Canadian avenues.

The Berkshire.

Of British breeds the most widely distributed is the Berkshire, originating in Berkshire and adjacent counties in England, and now distributed throughout almost every country in the world. The Berkshire, black in colour with white points, is of a dual purpose nature, good alike for use in the production of pigs for the pork and bacon trade and for stud purposes. Standing at the head of the list in the Australian pig world, the Berkshire issues a challenge to all other breeds to be up and doing.

The Yorkshire.

The Yorkshire breed, of which we have two distinct types—the Large Yorkshire, or Large White, and the medium type known as the Middle York, or Middle White—is well known also, and has been popular in Australia ever since pig breeding first began. These White Yorkshire pigs have, however, in recent years in Queensland lost a good deal of their former popularity, and are not now so widely bred as they were a few years ago. This falling off in popular favour is not altogether due to any particular weakness in this class of pig, but is largely due to an inherited tendency in the breed to produce pigs which, while of excellent quality and capable of complete development, are, nevertheless, somewhat soft in the skin, and are subject to sunburn and sunscald unless they are carefully tended and given improved conditions in regard to housing and accommodation. The Large Yorkshire has not as yet (January, 1930) been introduced or popularised in Queensland, but it is quite certain that before very long enthusiastic fanciers of this type will have available for sale selected males and females of this very desirable breed. The Middle Yorkshire has been with us for many years, and was for quite a long time popularised and distributed by that grand old Berkshire-Yorkshire fancier, the late Mr. W. J. Warburton, popularly known as "Old Warby," of the Northgate Stud, Northgate Junction, a few miles outside Brisbane. Unfortunately, the original stud was dispersed on the death of its founder, though one or two of the sons still carry a few of these popular pigs. These breeds were originally also distributed largely through the efforts of that venerable and enthusiastic citizen, Mr. W. R. (or more frequently known as "Billy") Robinson, of Toowoomba, who has, through a long series of years, interested himself and many others in the gospel of "better pigs on every farm."

The Tamworth.

It is forty or more years since the Tamworth, the red pig of old England, was first introduced into this part of the world, and all through these years the breed has been spoken of as one of the best for crossbreeding with Berkshires and similar types for the production of prime quality, fleshy bacon. Originally developed and distributed from Tamworth, one of the midland counties of England, this red breed has, during recent years, had a very wide distribution throughout the world, and though decidedly unpopular still with many of the old-time farmers, is gradually breaking new ground, and is becoming more popular as the years go by. We must thank the Chirnside family in Victoria, and the Hawkesbury Agricultural College in New South Wales, for the introduction of this type, and for the part they have played in periodically introducing fresh strains. The Tamworth's red colour distinguishes him from any of the other British breeds, and his suitability for the purpose for which he is kept stands almost unchallenged.

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* In a radio talk from 4QG.

The Gloucester Old Spot.

It is but a dozen years or more since the Gloucester Old Spot—also spoken of as the G.O.S. breed—was introduced from Great Britain, the country of its origin. For many years this was the most popular local breed in Gloucestershire and adjacent counties in England, and was looked upon there as the ideal pig for general farm use. Its introduction into Australia in the care of Mr. A. E. Ball, now of Victoria, was arranged through the G.O.S. Pig Society of England, the objective being to widen the field and pave the way for a very liberal, though later, importation of this class of pig into the Commonwealth. The G.O.S. has had a very good run, it has become popular in all the States, and bids fair to become one of the most popular of all the breeds in this great Southern land. Black and white spotted in colour, and of a very growthy type, this old-world breed has a special appeal to all those who like big roomy stock capable of rapid development, early maturity, and an ability to put on large quantities of flesh with a minimum of feed and attention. The breed has a popular reputation both for pork and bacon production, and also for stud-breeding purposes, and has already proved in the show ring as well as in commercial pig keeping its ability to stand up to the conditions and make good progress. The Kingston Pig Farm Company have the largest stud of this breed in Queensland, and were among the first to have them introduced.

The Large Black.

Originally referred to as the British Large Black or the Old Devonshire breed, this old-world large black breed is whole black in colour, and has the long drooping ears characteristic of both this and the G.O.S. breeds. Long and deep in body and of a distinctly bacon type, the Large Black has been introduced specially for crossing with Berkshires, Poland-Chinas, Yorkshires, and similar breeds for the production of bacon pigs of a fleshy and desirable type. Popularised very largely in the first instance in New South Wales by Mr. Herbert Garrett, of the Loch Maree Stud then at Randwick, this breed has had a wide distribution, though during recent years the older strains have given place to more recently imported and more up-to-date types. The breed was recently introduced into Queensland through the generosity of Captain H. N. Callcott, of the Wattle Herd of Large Blacks at Gigarre, Victoria, who presented to the Queensland Schools Pig Club Scheme a very fine Large Black boar, since then the winner of many championships here, and the foundation sire of Mr. George Davison's stud at North Arm. The winning of this boar at a Pig Club Contest by Master George Davison led to the purchase for their stud of a very fine sow, Wattle Violet, a profitmaker of the very best type, and thus the breed has been introduced into this Northern portion of the Commonwealth. There are many fanciers of this roomy, deep-bodied type, and they have a good future before them.

The American Breeds.

The battle between the British and the American breeds is being waged in quite a businesslike way, for both sides are out to win, and both are prepared to spend both time and money in the struggle for first place.

Of American breeds we have but three, as against six of British origin, but there are several extremely enthusiastic breeders of the American types who count this no great hindrance to their progress.

The Poland-China.

The Poland-China, black in colour with white points, was the first of the American breeds to be introduced and distributed, and for many years this breed has forged ahead against the odds and has won considerable ground, their only disadvantage being that, unless very carefully handled, they are of a type that fattens rather too readily on the class of food largely used in pig-breeding activities in this State. The breed crosses remarkably well with the Tamworth, and doubtless in years to come a very great deal more will be heard of this popular cross than at present.

PLATE 34.—DOWN ON THE FARM.

A familiar scene on the farm where pig raising occupies the position its value and importance demands. These Yorkshire-Berkshire cross pigs are of a type much in demand by both pork butchers and bacon curers, and were healthy, well developed, and full of profit.

PLATE 35.—PIGS FOR PROFIT.

This is the litter that, in 1928, was classed as the World's Champion Litter of Duroc-Jersey Pigs—seventeen pigs in one litter weighing more than two tons when six months old. They were described as profit makers of the most up-to-date type. They were born and bred in the corn belt of the United States of America.

The Duroc-Jersey.

In the Duroc-Jersey, the red pig of American origin, we have a breed very similar in shape and appearance, but quite distinct in colour to the Poland-China, and a breed that has gained immense popularity during the comparatively short period it has had a place in our pig industry. Useful alike for crossbreeding for pork and bacon production and for stud-breeding purposes, these American breeds have taken a stand from which it will be difficult to shift them, and as they are already popular, it would appear they will be well worth watching as time goes on.

The Chester White.

More recently still another American breed—the Chester White—has been introduced and is taking its place for the purposes of crossbreeding, probably principally for bacon pig production, though they have a good reputation in the United States of America as a good all-round farmers' pig. This breed is distinctly white in colour, and also has small lopped or drooping ears, a characteristic familiar to all the American breeds we have so far introduced, though the ears are smaller than in the case of the Large Black and G.O.S.

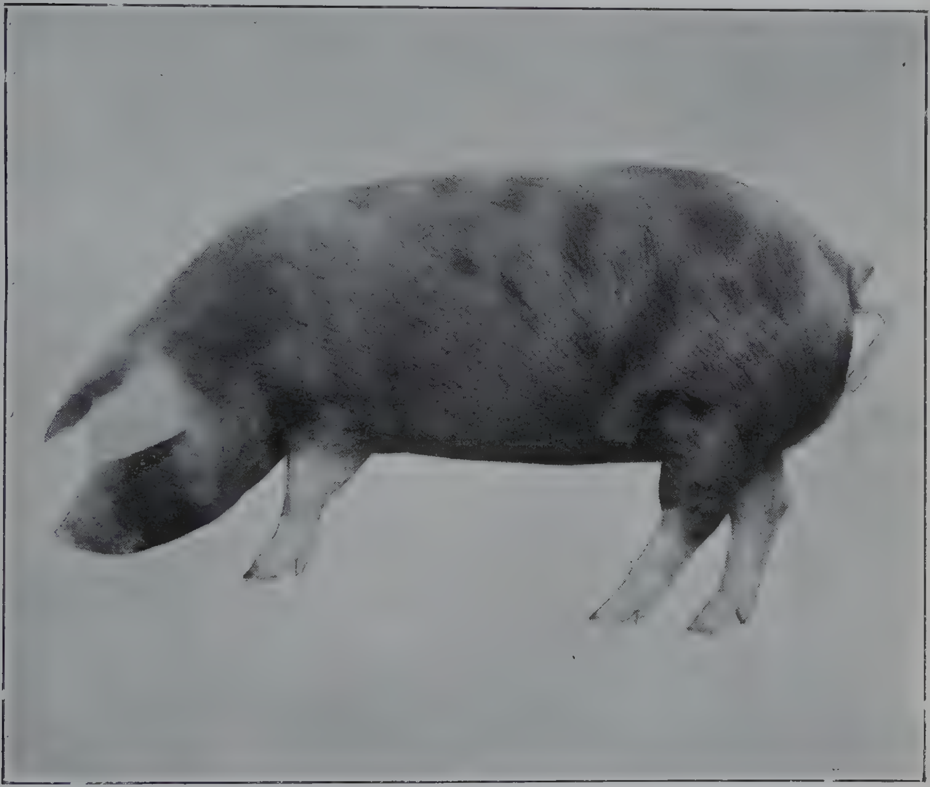

PLATE 36.—A PRIME QUALITY BACON PIG OF DESIRABLE TYPE AND WEIGHT.

Queensland bacon factories pay top prices for prime quality baconers, 95 to 120 lb. dressed weight, and for such there is an ever-increasing demand.

It will be seen, therefore, that with nine excellent quality and well-recognised breeds of pigs, six of British and three of American origin, all competing together in the battle of the breeds, some interesting results may be looked for; while a considerable amount of publicity will be necessary to still further popularise all or any of these that show distinct evidences of superiority, and that are able to stand up to the competition better than others in this fight for commercial supremacy in the Australian pig world.

THE BABCOCK TEST OF PORK PRODUCTION.

Through the courtesy of Dr. John M. Evvard, the American authority on swine production, accorded to the Senior Instructor in Pig Raising, Mr. E. J. Shelton, we are able to publish the following outline of what he refers to as the Babcock Test of Pork Production, a story in which readers generally will be interested, whether they are engaged in the production of pigs or not. Dr. Evvard has written many interesting and informative reports, and though the figures refer to American conditions, they are equally applicable in their own way to conditions in Australia.—ED.

Speedy gains are the key to what we may call the "Babcock Test of Pork Production." You know all about the Babcock test for milk production—how the use of a simple outfit for determining butter-fat content has helped dairymen to cull out poor cows, and build up herds that, instead of yielding 300 lb. of butter-fat yearly, produce 700 to 1,000 lb.

My colleagues and I here at the Iowa Agricultural Experiment Station (United States of America) have been seeking an equally effective way of finding out how to select the most profitable pigs, just as the dairyman can readily know his best paying cows. I am going to tell you about this most practical discovery, which is so simple that we marvel it has been overlooked so long.

Since 1910 we have studied the productive efficiency of hundreds and hundreds of swine. We observed that the most profitable pigs were those that made the most rapid gains, with very few exceptions. We also found that if we wanted pigs to weigh 200 lb. and more at six months of age, we succeeded better when we selected breeding sows whose brothers, sisters, and sons and daughters, and other near relatives showed rapid gaining abilities. We also noted that if we used boars which came from rapidly-gaining strains, mating these with the rapidly-gaining strain of sows, the offspring weighed much more at six months of age than when we used sires and dams that came from slow-gaining blood lines. So here we have our clue. The rapid gainers were the most efficient for the breeding herd.

Our next step was to study thousands of swine to determine whether or not the feed requirements of the rapidly-gaining animals were less than those which reached marketable age slowly. We studied the records of a multitude of pigs from the time they were weaned at 40 lb. until they went to market at 225 lb. We learned that pigs which gained only ½ lb. per head between sunsets took approximately 486 lb. of feed for each hundredweight of gain. Pigs which gained 1 lb. per head daily took only 430 lb. of feed for the same weight of increase, or 56 lb. less for the 100 lb. of pork yield. That was gratifying.

We proceeded and found that pigs which put on 1.5 lb. daily took even less feed than the 1-lb. gainers, or only 374 lb., thus showing another decrease in feed requirements amounting to 56 lb.

The conclusion is evident; to get efficiency of production, to make a bushel of corn and other feeds yield the most in pork products and by-products, it is necessary to pick out "speedy" pigs which put on weight at a rapid clip. By speeding up the gain from 1 to 2 lb. per head daily, the feed requirement was cut 112 lb. on the hundredweight of gain attained. That is real economy.

In analysing our figures more closely we discovered that for every one-tenth of a pound of extra gain put on by the pigs we saved 11 to 12 lb. of feed per 100 lb. of pork made. And a tenth of a pound extra gain per head daily makes approximately 3 lb. more weight per month, some 18 lb. greater production in six months.

Forty-pound pigs that gain a pound daily take 185 days to reach the handy marketable weight of 225 lb. (as sought after in the United States of America), whereas the more efficient pen-mates which gain 1.1 lb. in the average twenty-four hours take only 168 days to reach the same marketing goal. Here we have a saving in time of seventeen days, and that is another advantage.

Thus by increasing the rapidity of gains we save feed, time, labour, overhead expense, and likewise we save even more by reducing the risk of sickness and death. Then, too, the pigs that reach the market weight the quickest usually sell for better prices, because the earlier markets for spring as well as fall (autumn) pigs are higher than later ones. With a faster turnover you have money longer in the bank, and not so long in pigs. Hence, everything considered, it is a profitable proposition to produce pork with pigs which put on gains so quickly.

The profit for future years should be the greater when we apply in practice these facts presented herein and use for breeding stock those members of the herd which show the most speed in attaining the mature weight. By mating high-gainers with high-gainers the progeny are more efficient than if we follow the opposite procedure, and the resulting offspring should make more pounds of pork per bushel of corn and other feed fed.

It is profitable to follow the rigid policy of selecting only those individuals which come from rapidly-gaining strains for the breeding herd. If this practice is executed year after year, the swine herd should be placed upon a high plane of efficiency from the production and early marketing standpoints.

Some of my friends have been selecting for market the gilt (sow) pigs which have done the best, put on the most rapid gains. The temptation to do this is strong, because such pigs are usually ready to sell before the market prices begin to drop in the fall or late spring. Such procedure, however, takes from the herd the best individuals, thus handicapping future breeding progress.

It is common practice on the part of a great many to separate selected breeding gilts from the growing and fattening herd when they are four or five months old. If one does this, but finds later that the brothers and sisters of any selected gilts do not make acceptable gains in the market-fed group, it is wise to discard that particular gilt from the breeding-yards. We judge the future breeding efficiency of the gilt, not only by her performance but also by the development of her closest relatives. It is certainly true that "blood tells."

We are anxiously awaiting the day when thousands of our progressive swine-breeders will be producing 200-lb. pigs for market in four to five months.

THE EMPIRE PIG BUSINESS.

THE BRITISH MARKET.

The twelfth report of the Imperial Economic Committee, just issued, deals with pigs and pig products. It emphasises the great hold obtained on the main bacon market in the United Kingdom by foreign competitors who have concentrated on the production of a standardised type of pig and organised the trade in bacon on a national basis. Taste in pig products varies in different parts of Great Britain, but the report states that:—

"A general change is in progress in the prevailing taste. . . . A liking for smaller and leaner cuts in place of fat heavy joints was becoming apparent in England in the latter half of the last century. The lean type of bacon and ham, and the small cut of pork, are now firmly established as the predominent requirements throughout the South of England. In the Midlands the demand is for a somewhat fatter product and for sausages, pork pies, and "processed" meats, whilst further north still fatter products find a ready market."

In spite of these local differences the general preference for the lean type of bacon is growing. Danish farmers and bacon factories have concentrated on supplying this type.

Ninety years ago Great Britain was an exporter of pig meat, but to-day is dependent on imports for two-thirds of its supply. Nearly half the total imports, which altogether are valued at £55,000,000 a year, consists of bacon from Denmark, in which practically only one type of pig—evolved largely from the large White Yorkshire strain—is maintained. Payments are based on weight and quality grades, and all exports are subject to constant and strict inspection. The vast majority of pigs give dead-weight carcasses between 132 and 158 lb., lower prices being paid for carcasses outside this narrow range. Bacon so produced is marked in England as "Danish," and not under factory brands. It is all of the mild-cured type, and a very regular supply is maintained.

Dominion Supplies.

At present the whole of the overseas Empire contributes less than one-seventh of the total imports of pig products into the United Kingdom. Canada and the Irish Free State are the chief suppliers. Since the war New Zealand has been developing a very useful trade in frozen pork, both for sale as pork and for curing into bacon.

The consumption of pig products in the United Kingdom, though below those of Canada and the United States, has increased since the war by about 50 per cent. in weight and 100 per cent. in value, due almost wholly to larger imports of lard, bacon, and frozen pork. Foreign countries have received almost the whole benefit of this expansion.

Conditions of Competition.

The report emphasises the necessity for meeting consumers' tastes and of maintaining a regular supply. It contains a statement by representatives of both the bacon and pork trades of the characters to which the products should conform to meet the main market and of the breeds which yield carcasses of the requisite types. The report points out the great possibilities which exist within the Empire. It expresses the definite opinion that these possibilities are unlikely to be realised without organisation amongst the producers and the adoption by them and the curing industry of a joint common policy.

Research.

The report advocates that entry into the herd books should be dependent upon commercial performance and not only on show points. It advocates further research into the problems of nutrition generally, but states that—

> ''from the point of view of the substitution of Empire products for those of foreign countries, perhaps the most fruitful line of research lies in the effort to make possible the carriage, without detriment, of mild-cured bacon from the Southern Dominions.''

Preliminary experiments conducted at Cambridge on the freezing and cold storage of bacon are full of promise. They indicate that with certain modifications of present practice the problems of transport of mild-cured bacon from the Southern Dominions should be possible. The report strongly advocates that those experiments should be continued and developed with a view to testing their results in commercial practice.

Competitors Comparatively Few.

In spite of the large size of the import trade into Great Britain, supplies are drawn from comparatively few countries, the chief being Denmark, United States, Sweden, and Holland. The trade from the United States consists mainly in lard and hams, and it is possible that countries in the Empire producing large crops of maize might compete in that trade. The portions of the Empire in which the possibilities at present are most promising are the Irish Free State, Canada, Australia, New Zealand, and South Africa.

The report emphasises that regularity of supply is essential for a steady trade. ''The idea that the top of the market can easily be caught by an 'in-and-out' policy is an illusion.''

The committee envisaged ''a great problem—nothing less than the replacement of the foreigner by the Empire farmer in the main supply of the standard article to the British market.'' For this standards of size and quality, adequate quantity, regular supply, and competitive prices are essential.

''The general effect of our report may be summed up in the words—the mobilisation of the producer. The benefits to the small farmer of a successful pig industry are so obvious as to justify, in our opinion, a great co-operative effort involving the farmers and traders of the Empire and, indeed, the Governments.''

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

Answers to Correspondents.

PIG RAISING.

Replies selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.:—

Rice Meal for Pigs—Cotton Seed.

D.B. (Ceratodus, Upper Burnett)—

1. Care must be exercised in using any meal or food to which pigs are not accustomed, and we think, in your initial practice in using rice meal, that if you add just sufficient salt to give the food a slight flavour, or molasses to sweeten the mixture slightly, you will soon accustom the stock to the rice meal. If you do not do this you will probably find the pigs refuse the food awhile before they become more accustomed to it. Where used judiciously in conjunction with green foods and foods carrying a high percentage of protein (pea meal, made from cowpeas or field peas, &c.) or green lucerne or even lucerne hay or lucerne chaff, good results may be looked for, though the general opinion of pig feeders is that the pollard is more palatable to pigs than rice meal.
2. Generally speaking, we consider cotton seed meal a risky food to use for pig feeding purposes, though this is not because it is not a good food as pig foods go, but solely because it needs to be used judiciously and with very much greater care than is ordinarily observed in the feeding of this class of stock. The pamphlet dealing with stock foods—a copy of which has been sent to you with several other pamphlets—deals with the use of this food for all classes of stock. The Supervisor of Dairying and the Poultry Instructor will advise on the use of cotton seed for calves and poultry respectively, and the pamphlets available on poultry and turkey raising have been forwarded. If you use cotton seed meal as a food for pigs it will need to be used in small quantities, not more than 10 per cent. for a start, and it should be soaked in and mixed in with other meals and with milk, for it is a comparatively expensive food that needs very careful handling.

Pneumonia in Pigs.

W.E.M. (Boyne Valley Line)—

It seems to us from your account that you have had some trouble with a form of contagious pneumonia among your pigs, a trouble all too common among young stock, and one that is extremely difficult to handle. Isolation of all sickly stock must be the first move in any condition indicating ill-health, after which special care and attention to the wants of these "off-colour sorts" must claim part of your time. Falling back on the good old castor oil will be effective in freshening up the sickly pigs, after which we believe tablespoonful doses of cod liver oil and some phosphates, bonemeal, and other mineral mixtures in the food must follow, the cod liver oil being given as a drench if this is possible or in a small quantity of warm food and a pinch of salt early in the morning. We believe a good oiling of the skin, using petroleum jelly or some other similar mixture, is just as good as internal medicine, for it seems that unless we can freshen up the "off-colour" stock and put them into better heart it is a difficult task getting them back on the right track.

It is difficult, even dangerous, to attempt drenching of a pig suffering from pneumonia, hence if the breathing is at all laboured or short and jerky, it is better to depend on using the oil in a form of a bran mash than as a drench, and, in all cases, a pinch of salt to take away the flavour of the oil and increase the thirst will be effective. Give ample supplies of clean drinking water and as much green food as is possible. Doubtless you have treated them for intestinal worms, for if worms are present in any number they cause distress and laboured breathing plus some pain. We note you have tried Nema capsules, and will await your further advice on results with interest. Flies are no doubt responsible for much of the trouble to which live stock are subject. Mosquitoes, too, cause trouble, and these, with intestinal parasites, give weak young stock a very bad spin. The symptoms you describe might be taken to indicate general ill-health, indigestion, and bowel disorders, plus a tendency to lung troubles. Why not open one up and let us have results of your post-mortem? Be careful to incise all the glands, search for lung and intestinal worms and for kidney worms, and be especially careful to note if there is any inflammation of the stomach, intestines, and lungs. We cannot advise more than this without inspection, for it's no good spending money on the purchase of drugs if the seat of trouble is local or parasitic.

Ground Pumpkin Seed as Pig Feed.

R.C.L. (Proston, via Murgon)—

1. Ground pumpkin seed has the reputation of being particularly useful in the treatment of pigs suffering from intestinal worms, some breeders considering this product even more beneficial than turpentine or other drugs when used as a vermifuge (worm-expellent). We would not recommend ground pumpkin seed as a food for pigs unless mixed with other foods, and the Poultry Instructor (Mr. Rumball) informs us that he would not recommend them as a food for poultry at all, as poultry appear to be very susceptible to the poison these seeds contain. No doubt both pigs and poultry consume a proportion of seed when being fed on raw or cooked pumpkin from which the seed has not previously been extracted without ill-effect, but it would certainly be inadvisable to feed such seed unless with considerable caution, as an excess of highly concentrated seed matter might be responsible for derangement of the digestive system and for other ailments. If they are being used they should be mixed up with a liberal supply of other less-concentrated foods and be fed (with caution) in that form.

   Henry and Morrison in their book, "Feeds and Feeding," state that as pumpkin seeds contain much nutriment they should not be removed before feeding. They estimate that 1 ton of pumpkins, including seed, equals in feeding value for dairy cows about 333 to 400 lb. mixed hay or 800 lb. of corn silage. Though often cooked for pigs, trials show equally satisfactory results with raw pumpkins.

   Rommel, summarising the findings of three experiment stations, reports that 273 lb. of grain together with 376 lb. of raw pumpkins gave 100 lb. of gain with fattening pigs. When cooked it required 1,150 lb. of pumpkins and 222 lb. of grain for 100 lb. of gain. They also add that feeding an undue allowance of seeds would tend to cause digestive disturbances on account of their richness.

2. *Best class of pig for market.*—Extensive reference has been made to this subject in the pamphlet dealing with "Economic Phases of Pig Raising," of which a copy has been sent to you. From that publication and from others forwarded you will note that the principal demand in this State is for prime quality bacon pigs weighing from 95 to 120 lb. dressed weight (approximately 140 to 170 lb. live weight). The factories do not specify any particular breed or cross, but the pigs must be in prime condition, not too fat, and must be firm and able to stand up to the journey by train or other conveyance to the factory. A type similar to that produced from the Tamworth-Berkshire cross has given satisfaction, but pigs of other breeding give equally satisfactory results if they are well grown and developed and properly fed and handled.

To Rid Pigs of Lice—Hair Growth on Pigs.

H.H. (Kingston)—

1. To rid pigs of lice and other external parasites, prepare a mixture composed of ½ pint of benzine, ½ pint of kerosene, and 7 pints of fish or other cheap oil. Mix together thoroughly, store in a clean tin or jar, and apply per hand or per soft cloth or brush after the animals have been freed from accumulations of mud and dirt by washing. Repeat the application in three days' time, and then occasionally when it is noticed lice are about again. This will effectively deal with the lice and keep the skin soft and clean.

2. For encouraging the growth of hair on bare patches we recommend coconut oil, which may be purchased in bulk tins of 1 to 14 lb. at wholesale druggists. This oil is quite soft during summer months, but may require heating to soften during the winter time. It is a reliable preparation for encouraging rapid growth, and keeps the skin soft, free from scurf, and in mellow condition. Petroleum jelly may also be used in a similar way, and is also quite a good preparation.

General Notes.

New Sanctuaries for Native Fauna.

The State Forest Reserve (R. 452), portion 255, East Barron (Atherton), and the Reserve for Water and Gravel (R. 536), parish of Kalkie (Bundaberg), have been proclaimed sanctuaries under the Animals and Birds Acts. It shall be unlawful for any person to take or kill any animal or bird in these areas.

Standard Fruit Case.

The Fruit and Vegetable Grading and Packing Regulations of 1928, made under "*The Fruit and Vegetables Act of* 1927," have been amended by altering the dimensions of the Canadian standard case. The dimensions of that case now read—"Eighteen inches long by eleven and one-half inches wide by ten and one-half inches deep."

Queensland's Bread Needs.

"I find that the consumption of wheat in Queensland in the matter of the bread requirements of the people may be taken at approximately 5,000,000 bushels, exclusive of requirements for seed, poultry feed, and such like. Over a period of eleven years we have produced on the average barely half these requirements. A doubling of the wheat production of the State would mean an increase in the income of the State of close upon £750,000 per annum."—Hon. H. F. Walker, Minister for Agriculture.

An English View of Emigration.

"We transport criminals no longer; we emigrate the poor instead. Carelessness in choosing emigrants and in fostering their welfare when once they have left our shores has created in the public mind the firm conviction that what was once a punishment for crime has become a punishment for poverty. The spread of education no less than the increase in security at home, represented by the development of schemes of social insurance, has made men more and more reluctant to emigrate. Despite the unparalleled unemployment experienced since the war, the passing of the Empire Settlement Act of 1922, and the activities of the Overseas Settlement Committee, the number of emigrants has declined steadily since 1913. In the years 1911-13 240,000 workers on the average sought fame and fortune in the self-governing Dominions. In the years 1925-27 the average fell to 107,000. 'Training and After-care' must become the motto of the emigration authorities. They must offer emigrants the opportunity to equip themselves for the tasks of pioneering. They must offer emigrants sound prospects of winning a decent livelihood and of building up a decent home life; and one way to do that is to induce the Empire Government to protect their people by legislation in the same way as citizens are protected in the Home Country."—"Co-operative News."

Staff Changes and Appointments.

Messrs. G. Bell, R. C. Gilmour, J. I. Lomas, J. C. Schnitzerling, A. Clowes, and F. J. Kingsford, of the Warwick district, have been appointed Honorary Rangers under the Animals and Birds Acts for the sanctuary at Connolly Dam, Warwick.

The Police Magistrate at Blackall has been reappointed Government Representative on the Barcoo Dingo Board.

Sergeant C. J. Perrin, of Gladstone, has been appointed an Inspector of Slaughter-houses as from the 16th November, 1929.

Mr. T. E. Dwyer, Clerk of Petty Sessions, Mackay, has been appointed chairman of the Cattle Creek, North Eton, and Racecourse Local Sugar Cane Prices Boards for the 1929 sugar season, vice Mr. J. J. Scheibein, resigned.

Messrs. G. R. Passmore, A. B. Greer, and James Grindle, of Wacol, have been appointed Officers under the Animals and Birds Acts to prevent the shooting of native animals and birds in the Wacol district.

Mr. C. D. Hogan, Senior Clerk, Government Workshops, Ipswich road, Department of Public Works, has been seconded for duty as Senior Clerk (Accounts), Agricultural Bank, for a period of three months.

An Order in Council has been passed proclaiming the Goodna Recreation Reserve No. 359, county of Stanley, parish of Goodna, to be a Sanctuary for the protection and preservation of native animals and birds.

Foods that Taint Pork.

Recent inquiries indicate that the use of fish meal, fish oil, and whale oil as supplements in the feeding of pigs is to be strongly discouraged after the pigs reach the age at which they are usually penned up or otherwise prepared for the final fattening stages of development. Experiments are in progress in New Zealand and elsewhere aiming at determining up to what period before killing, fish meal, fish oils, &c., can be fed without tainting the carcass. That there is a certain amount of risk with all these oily foods, and with peanuts and soya beans, when fed to pigs in the fattening stages—*i.e.*, two months before slaughter—is well known to all authorities on pig feeding, though many farmers appear to be unaware of the risks involved. The matter is one that needs further investigation, and is a subject that might well be discussed at meetings of the pig industry committees and other bodies specially interested in the production and marketing of pork products.

Australian Beef Wins.

A cable message from London, 3rd December.—The result of the secret ballot on beef exhibits at Australia House, at which Mr. T. Trumble (Official Secretary at Australia House) presided, was as follows:—Australian beef, 364; Scottish, 354; Argentine, chilled, 348.

The guests each had a slice of each kind of beef, not knowing from which class it had been cut. The highest points went to beef cut from an Australian two-year-old Hereford.

Colonel Dunlop-Young, the City of London's chief veterinary surgeon, revealed that he had placed Australian beef first, saying that it was Scottish opinion of English-bred, but grown in Australia.

Resident Entomologist for Nambour.

Mr. H. F. Walker, Secretary for Agriculture and Stock, has announced that Mr. W. A. T. Summerville, Assistant Entomologist at the Head Office of the Department of Agriculture and Stock, will, in future, have his headquarters at Nambour. Mr. Walker states that this action is part of the policy of decentralisation to ensure as far as possible that certain technical officers of the Department shall be stationed in the centre of the districts in which their work will primarily lie.

Mr. Summerville entered the Public Service as a learner in the Entomological Section of the Department in 1922. In his spare time he studied at the Queensland University and secured his B.Sc. degree last April. Mr. Summerville has specialised in the diseases of citrus fruits, and it is chiefly for this reason that Nambour has been selected as his headquarters. There will be associated with him in the Blackall Range Mr. R. L. Prest, Instructor in Fruit Culture, whose speciality is also citrus fruits.

Both Mr. Prest and Mr. Summerville have a sound knowledge of horticulture and entomology respectively, and both are capable of advising fruitgrowers on cultural and plant disease matters generally.

Tourist Bureau—Opening of New Premises.

Recently the control of the Government Tourist Bureau was handed over to the Commissioner for Railways (Mr. J. W. Davidson) with a view to a more satisfactory handling of the tourist business, with which the railways are so closely identified.

Mr. Davidson decided upon a scheme of reorganisation, involving the bringing together of the tourist activities and the principal city railway booking office. He made certain rearrangements of the disposition of his staff which allowed of the major portion of the floor area of the Commissioner's Office in George street being converted into a tourist bureau and city booking office. Show windows for the display of photographs and publicity matter have been installed on the street frontage, and considerable interior alteration has been made to suit requirements.

The new booking office is open to the public for the purchase of tickets and reservation of seats and sleeping berths on interstate and Queensland mail trains, as well as for the sale of tickets for the South Coast line (Southport and beyond) from 9 a.m. to 5.30 p.m., Monday to Friday inclusive, and from 9 a.m. to noon on Saturday; outside the hours named bookings will be conducted at the ticket office on No. 1 platform, Central Station, but the issue of post-dated tickets and reservations from that office will be restricted to one week ahead, whereas booking will be made at the city office for twenty-eight days ahead as heretofore.

Tickets for special trips, including accommodation or meals, will be sold at the bureau booking office counter in the Tourist Bureau, which will be quite distinct from the railway booking office situated in the same building near Queen street.

Australian Wheat a Winner.

Thus a Press message from Chicago, 2nd December:—J. W. Eade, of Euchareena, New South Wales, won first place with White Spring wheat at the International Live Stock Exposition on Monday.

Running a Family.

Either to let the children grow as they will and do anything they please, or else to establish a benevolent but firm autocracy, is a simple way to run a family. Both these types of household, however, for purposes of training children, are as cheap as they are easy. The youths who are best fitted to be good citizens in the new generation come out of democratic homes. A child from the beginning ought to be called into the family's counsels and consulted on the family's affairs. A little child, if well handled, is the most loyal of creatures and would far rather than not be devoted to his group and co-operative in its interests..—Dr. Fosdick in "World To-day."

Prevention of Swine Fever.

The most recent literature dealing with diseases of the pig and kindred subjects indicates that to avert the risk of swine fever preventive measures are necessary. Following is a summary of the measures recommended:—

(1) Prohibition of the importation of pork or other pig products from any country except those that are declared free from swine fever, and the prohibition of the use of ship's garbage as pig feed.
(2) Prompt notification by each State of the occurrence of outbreaks of swine fever or suspected swine fever.
(3) Slaughter of all pigs on any holding on which swine fever occurs, and the destruction of carcasses of such pigs.
(4) Thorough boiling of all household refuse and garbage on the premises on which the pigs are being kept before such refuse or garbage is fed to the pigs.
(5) The introduction of a system of pig branding which would enable pigs to be more definitely traced within the State.

It has been noted further in regard to the spread of swine fever that next to the living infected animal the feeding of pork scraps in garbage is the most important means by which disease is spread.—From reports of an address by Mr. Max Henry, Chief Veterinary Surgeon of the Department of Agriculture of New South Wales, at a meeting of the Pig Industry Committee of New South Wales.

Levy on Stanthorpe Fruit and Vegetables.

Regulations have been issued under the Fruit Marketing Organisation Acts renewing for a further twelve months the levy on Stanthorpe fruit and vegetables.

This levy consists of 10d. per ton on all fruit and vegetables railed from all railway stations between Wallangarra and Dalveen (including all stations on the Amiens-Pikedale Branch). Where more than one grower contributes fruit or vegetables to any one consignment, the total amount of the levy payable will be paid in proportion by the different growers, there being a minimum of 1d. payable in respect of any one consignment by any grower who, in his name or otherwise, contributes any fruit or vegetables to such a consignment.

The extension of the levy has been made at the request of the Deciduous Sectional Group Committee, and has been endorsed by the Committee of Direction. The manner of making the levy is as follows:—

A resolution shall be passed by the Committee of Direction that the levy be made, and thereupon the Committee gives notice prior to the 7th December, 1929, by public advertisement of the levy, and upon such publication the levy shall be deemed to have been duly made.

The growers liable to pay the levy shall pay the same to the Commissioner for Railways on behalf of the Committee of Direction at the time they are consigning their fruit or vegetables. The levy will be expended in the payment of any expenses attaching to the collection of the levy, and the balance shall form part of the general funds for administrative purposes, and shall be utilised by the Deciduous Sectional Group Committee. The levy will operate for twelve months as from the 7th December, 1929.

The levy for the coming year will be 10d. per ton as against 5d. per ton last year.

Are there Too Many Shopkeepers?

"More than a century has elapsed since Napoleon stigmatised Britain as a nation of shopkeepers, but even to-day the taunt contains a certain element of truth. A visitor to the ordinary small country town will find that, apart from a few local industries, the main business of the town consists of shopkeeping, so much so, that he may well be pardoned for wondering whether all the shopkeepers in the town are trying to make a living by selling their wares to each other. This question as to whether the number and variety of retail shops in this country is redundant to its needs is one of considerable economic importance. Too many shops with too much competition can be as great an evil as too few. An excessive number of shops means that each one has too small a turnover out of which to earn its fixed charges, and so means that retail prices rule higher than they would under an ideal number. If four competing tradesmen are making each morning the round of a street which one man could easily cover, that is a clear example of wasteful effort for which the consumer in the long run has to pay."—"The Economist."

Practical Education.

"There is a widely prevalent notion that university extension is a kind of watered-down version of the education that is given in the university itself," said Principal L. P. Jacks in a recent speech, "and I am afraid it is true that a good deal of it has hitherto been precisely that. But of late years our eyes have been gradually opened to the fact that a course of university and water appeals only to a very limited section of the adult population. There are other ways of educating adults which do appeal to men and which yield far better results. It has been found both here and in America that multitudes of adults to whom the offer of book learning through classes and lectures makes no appeal are quickly attracted by the offer of any kind of practical skill, and that those who begin in this way by learning to do something significant for themselves are easily led on to an interest in the literature which tells of the great doings of others and to an interest in the things of the spirit in general."

A Doubtful Ideal.

"We are hearing a great deal at present of the desirability of brightening 'rural areas' (by which phrase newspapers now refer to the country), the brightening up to be done, of course, by townsmen by means of wireless sets, libraries, picture-houses, and all the things from which the townsman wishes to escape when he goes to the country. If there is one thing which the country has and which the town has not it is peace, even if only in the form of silence, and if there is one thing which the town has which the country has not it is commotion, even if only in the form of noise. No doubt the countryman sometimes wishes that the peace of the countryside was not so peaceful, and the townsman on occasions thinks that he would find life more agreeable if there was not such a ceaseless coming and going in the streets; but when the countryman feels that he really must have a little more excitement he can go to the town, and when the townsman begins to desire above everything surcease from strife he can pay a visit to the country. But to introduce an artificial commotion into the country and an artificial calm into the town would make it impossible for the countryman to escape from the country and for the townsman to get away for awhile from the town."—Mr. Hubert O'Toole, in the "Cornhill Magazine."

Spare that Tree!

This might well be applied to Queensland:—

"It's a fine day; let's go out and cut down something," might be put forward as a New Zealand version of an old gibe against the Englishman's liking for destruction. Certainly the history of New Zealand is tragically rich in contrast between the glorious natural endowment of forest and the indifference so many New Zealanders show towards the fate of trees. Public conscience is being strengthened in this direction, but there is still so much to do that one welcomes every victory over the forces of destruction. Traffic is not everything, otherwise the praise of the American motorist for a certain prairie State would be wisdom. This man was ecstatic about roads that ran without a bend for many miles, on which a motorist could 'do fifty' and go to sleep at the wheel. Among the tree-lovers of Palmerston North were a number of women who had sufficient enterprise to hold a meeting, with the result that the cutting of trees in the street has been suspended, and probably they will be saved. This is an interesting blow struck for beauty as opposed to utility, and should encourage others to be active in the same good cause.—Auckland "Star."

Soil Research.

"Soil research, not from the point of view of agriculture only, but of the world's population, which depends on the products of the soil for its existence, is a cardinal factor in the advancement of civilisation. The time, although still far distant, can yet be envisaged when mankind will be so numerous that the earth will have difficulty in finding sustenance for the teeming multitudes," says the "Aberdeen Free Press" referring to the Institute of Soil Research, so recently generously endowed by Mr. T. B. Macaulay, president of the Sun Life Assurance Company, of Canada. "That nation is to be envied the productivity of whose soil is sufficient to meet its own needs in food. The agriculturally self-supporting State is, from the point of view of economics and of certain factors in man-power, the ideal country. We in Britain are so reduced in agricultural resources that five-sixths of our food has to be imported, entailing a tremendous drain upon our communal wealth. Our soil is old and weary after countless generations of cultivation."

A World's Champion—Three Lactation Periods.

Queen Bessie Pietertje Ormsby, a pedigree Friesian cow belonging to Elwood Farms, Deerfield, Illinois, recently completed an official production record of 28,122.7 lb. milk and 1,128.4 lb. fat, with an average test of 4.01 per cent. She now holds the world's record for production for any three lactation periods. Her records now are:—Two years, 985.06 lb. fat; four years, 1,095.26 lb. fat; five years, 1,172.75 lb. fat; seven years, 1,128.40 lb. fat. This makes an average for the three last periods of 1,073 lb. fat.

The only cow to beat her for four lactation periods is Springbank Snow Countess, a Canadian Friesian cow, with records as follows:—Two years, 749 lb. fat; three years, 979 lb. fat; mature, 1,125 lb. fat; mature, 1,122 lb. fat; mature, 1,113 lb. fat.

The paternal grandsire of this cow is Sir Pietertje Ormsby Mercedes, who is the paternal great grandsire of Pioneer Snow Ormsby, the imported bull belonging to the Oakview Stud Farms, Auckland.

Fertilisers—Prices Reduced.

Mr. E. H. Lindsey, secretary, Board of Trade (Price Fixing), announces that reductions have been made in the unit values of nitrogen as ammonium sulphate, of water soluble phosphoric acid in super.; also a slight reduction in the unit values of potash in both sulphate and chloride (muriate).

In the case of ammonium sulphate with a nitrogen content of 20.5 per cent., present maximum price for this percentage will now be £17 18s. 9d. per ton, as against the previous price of £20 10s.

In the case of super. with a water soluble phosphoric acid content of 20.5 per cent., present maximum price £7 8s. 7d., against £8 4s. previously.

Potash in the form of sulphate will now be £16 4s. per ton, as against £16 16s.

Muriate of potash (chloride) with a potash content of 50 per cent.—the maximum price will now be £14 7s. 6d. per ton, previous price £15.

In the case of phosphoric acid derived from bone, the unit value has been increased by 6d.

Church on Wheels—New Uses for Motor Car.

Two uncommon motor vehicles have just been completed to special order by British manufacturers. They are a travelling bathroom, ordered by an Indian prince, and a motor church, built to the specification of a Christian missionary society.

The mobile bathroom is built on a 30 cwt. chassis, and the interior includes a porcelain-lined bath, wash-hand basin, divan, and dressing table, all of which are cleverly designed to fit into the relatively small space available.

An ingenious apparatus, controlled by a thermostat, transfers the waste heat from the engine to the bath-water system, ensuring a constant supply of hot water. Special springs and Dunlop pneumatic tyres are fitted to the vehicle to ensure smooth running over rough jungle tracks. The car is to be used in the prince's hunting expeditions, and is fitted with a special glass which permits a clear view from the interior without the occupant being visible from the outside.

The motor "church" is mounted upon a lorry chassis fitted with Dunlop tyres, and it is equipped with an altar and reredos. The body is built so that it can be used as a pulpit, and the vehicle was consecrated before it was put into service.

The Richest Things in Life.

The whole edifice of modern civilisation would fall to the ground without a foundation of sound moral principle. The character of a people is the only security that can be relied upon for their making a proper use of the material advantages around them; all scientific inventions may come to nought, or even bring about evil, without moral guidance and inspiration (writes Mr. Charles Wicksteed in "Bygone Days and Now, a plea for Co-operation between Labour, Brains, and Capital"). The richest things in life are those that no wealth can give, and no poverty, short of destitution, can take away. An agricultural labourer who, with the aid of a thrifty wife, has a sufficiency, returning home after a hard day's work to the enjoyment of his frugal supper, with love in his heart for his wife and children, has the greatest joy that a man can have, and one which no millionaire can take away. A man may be rich, but no money will give him the joy he loses if he has no heart.

The First Veterinary Writers.

The veterinary art dates from that far-away time when man first bent the horse to his will. The earliest extant works on the diseases and injuries of horses belong to the fourth century of our era, and were written by army veterinarians of the Byzantine or Eastern Roman Empire, the chief of whom was one Apsyrtus, veterinarian in the army of Constantine the Great. The fourth century was not, however, the real starting-point of veterinary knowledge; there is ample evidence to show that there were skilled men in the times of ancient Greece. Xenophon wrote on the care and management of cavalry horses 800 years earlier than the time of Apsyrtus, and we know that his views are as true to-day as when written 2,400 years ago.

Aristotle, who lived 150 years later than Xenophon, devoted the eighth book of his history of animals to a consideration of veterinary medicine; he wrote, of course, as a layman. The Romans, on the other hand, were not skilled in medicine or surgery; in fact, for five centuries the medical art was unknown in Rome. Later they borrowed from Greece. If this was the condition of human practice it is easy to understand the position of veterinary medicine. Varro, a soldier who flourished in 36 B.C., and appears to have explored every branch of human activity, refers to the ancient Greek veterinarians as "Hippiatroi." He was evidently familiar with their work, of which, unfortunately, nothing remains. He himself wrote on the diseases of animals, and it is doubtless to such men that the Roman Army, even as early as the second century of our era, possessed an infirmary for sick animals, known as a "veterinarium." But Columella spoke of the "veterinarius," or animal physician, in 42 B.C. The irritating word "veterinary" is therefore extremely old; it disappeared with the final collapse of the Western Roman Empire, and was not met with again until the year 1528, though it did not appear in England until the closing days of the eighteenth century.

Vegetius' "Veterinary Art."—Among the contemporaries of Apsyrtus was one Chiron, a man whose work on veterinary medicine has only come to light in recent years. Shortly after Apsyrtus there lived a lawyer and gifted veterinarian, by name Hierocles, fragments of whose letters survive. It was from inspirations obtained from those gifted men that Vegetius, the Western Roman general, who flourished about the middle of the fifth century, wrote his remarkable treatise on "The Veterinary Art." He was not only a soldier, but a man of letters. Vegetius stands out in hold relief in the Western Roman Empire; he deplored the low state of the veterinary art in Italy, and tells us that the study of animal diseases is regarded as a mean and contemptible occupation. Though 1,500 years have passed since that was written, public opinion on this question has undergone very little change. The work of Vegetius may be read with interest to-day; he is very modern in some of his views, such, for instance, as the absurdity of regarding outbreaks of disease as being evidence of Divine wrath; he urges the public in these cases to place their faith in medical aid rather than in incantations and charms.

It is fortunate amid the disruptive influence of 1,000 years that the work of Vegetius has been spared and was amongst the earliest books printed in Europe, being published in 1528. Two years later what was left of the manuscripts of the Byzantine veterinary writers—i.e., Apsyrtus, Hierocles, and their many correspondents—was published in Paris under the orders of Francis I., the title then given to the collection being "The Hippiatrica." How these manuscripts got to Paris is unknown; probably, with many others, they were brought back from Constantinople by the Crusaders. It is interesting to note that a copy of the fragmentary manuscripts of these early Byzantine veterinary authorities is regarded as one of the literary treasures of the world.—"Live Stock Journal" (Eng.).

School Training.

It is quite true, as many persons might hasten to tell us, that great men have been developed without the benefits of University training; it is quite true that unusual genius will bring the man of special gifts to the front. But neither school nor University devotes itself to the development of the superman; the principal attention is devoted to that great mass of boys and girls who must have adequate opportunities, who must be strengthened and guided and taught. At no time in our history were we confronted with greater problems than those of to-day; never was there greater demand for the administrative and the operative ability of our citizens. Brains and character will be the first line of our national defence in the future. Can we afford to deny all reasonable facilities? That is for the people themselves to answer, because upon their answer depends the interest of Governments. —The "Brisbane Courier."

A Whitewash Formula.

Obtain, if possible, large pieces of fresh lump lime, place them in a very large bucket or other suitable container, and into this pour hot water. Cold water will do, but hot water is better as it hastens the slaking. The lime will start to boil and break up. Keep it covered all the time with about half an inch of water. This is important, for if whilst the lime is slaking it is allowed to rise up above the water in a dry powder it will "curdle," a condition tolerated only by inexperienced and indifferent workmen. Before the lime commences to boil fiercely, add tallow or common fat in the proportion of about 1 or 2 lb. to 7 lb. of lump lime. This makes a good binder which will prevent the wash from rubbing off.

If desired, a little yellow ochre may also be added, which will give a cream or buff tint according to the quantity used. When the lime is thoroughly slaked it should be stirred and sufficient water added to make it a little heavier than, say, milk, after which it should be strained, and, if desired, may be applied whilst hot.

Girdling the Earth.

"I'll put a girdle round about the earth in forty minutes," said Shakespeare through the mouth of Puck some 340 years ago. That was fantasy, for Magellan, who was the first to circumnavigate the earth, took three years only three-quarters of a century earlier. But who is to say that Puck's boast will not yet cease to be a boast? In the 16th century modern speeds were not dreamt of. During the last fifth-three years the time it has taken to "put a girdle round the earth" has been reduced from 117 days to twenty-one days. In 1876 Captain W. D. Seymour took 117 days in 1889, Miss Nellie Bly encircled the globe in 72 days 6 hours 11 minutes 14 seconds; since when the following times have been recorded:—Geo. Francis Train (1889), 67, 12, 3; Captain Fitzmorris (1901), 60, 13, 29 42⅖; Henry Frederick (1903), 54, 7, 20; Colonel Burnley Campbell (1907), 40, 19, 30; A. Jaegar-Schmidt (1911), 39, 19, 42, 37⅘; J. H. Mears (1913). who used a hydro-aeroplane to cross Paget Sound, 35, 21, 35, 0⅘; E. C. Evans and L. O. Wells (1926), 28, 14, 36, 51; J. H. Mears and Captain Chas. Collyer (1928), who took their own aeroplane and used it for eight flying days, 23, 15, 8; the Graf Zeppelin (1929), 21, 7, 32. All these people, except the travellers in the Graf Zeppelin, spent practically the whole of the time in actually travelling, whereas the Zeppelin was in flight only 11 days 23 hours 33 minutes.—"Brisbane Courier."

The Future of Cotton.

Discussing the outlook of the cotton industry in Lancashire, a writer in the "Fortnightly Review" suggests that probably too much attention is being devoted to the discovery of means for reviving the trade in coarse grey cloths, which other countries are able to produce themselves, and will continue to do so, even if they have to raise high tariffs against Lancashire. "Even if we do not recover any of that which has been lost, our cotton trade remains a very large one," he continues. "To say that the whole trade is doomed is ridiculous. To talk in generalities at all about the cotton trade is ridiculous. It is far too varied. There are plenty of units who have succeeded in doing well all through the bad years. We are still the largest exporting country of cotton textiles, and the home trade alone is not inconsiderable. All this will be stimulated by a cheapening of the cost of production. The same applies to the trade in new styles which we hope to see developed by ingenuity and craftsmanship. Ingenuity has not been lacking in the past, and one feels that it must still be present in plenty, unless it is being concentrated upon the newer industries of Great Britain. It has, however, been a peculiar feature of British mentality that a stimulus of impending disaster is required before really the latent ingenuity of the people can reveal itself. Witness the many rapid improvisations brought out by the war. Possibly the cotton trade is not yet sufficiently near to the abyss to awaken such inventive powers. Howbeit, upon ingenuity the future must largely rest, and upon the elimination of the inefficient producers.''

Rubber Tyre Wear and its Cause.

Interesting data about tyre wear and its causes is supplied by Mr. L. J. Lambourn, M.Sc., A. Inst. P., A.I.R.I. (Sc.), of the Fort Dunlop Research Laboratory, from which it is learnt that there is considerable difficulty in obtaining definite data about tyre wear if the research is confined to tyre service on the road. In comparing one tyre with another, speed, the type of driving, the type of car, the kind of road surface, the weather, the air temperature, all vary so much that it is not easy to get accurate results. In order to wipe out all these variables, a special machine has been developed and patented in which conditions representative of rough roads, wet roads, roads covered with dust, quick acceleration, wheel spin, high temperature, can all be reproduced and controlled. The relation between abrasion, or wear of tyres, and slip, which, of course, is always taking place when tyres are running, can be quite accurately determined. Approximately, the rate of wear increases not in direct ratio to the slip, but rather as the square of it up to values of about 25 per cent. Above that value, the relation is approximately linear. As showing the accuracy with which the machine and road results can be compared, samples of the actual treads of the machine and road results can be compared, samples of the actual treads of tyres were made into test wheels while the real tyres were run under average conditions, and the rate of wear of the tyre on the road and on the machine was compared. The value of a hundred being taken to represent the standard tread compound, the following results were obtained:—

RELATIVE WEAR.

On the Road.	On Machine.
100	100
130	139
142	150
225	200
93	95
117	117
92	92

Other tests, on the road, showed that one tyre on a car ran 8,400 miles during December to March while another, used during April, May, and June, ran only 6,000 miles. Another test, in which two exactly similar tyres were run at the same period on the rear wheels of two cars of the same type, showed that the rate of wear on the one run on rough roads was twice that of the other, run on tarmac. Two tyres were again run on the rear wheels of a touring car and a sports car respectively. The tyre on the touring car ran for 5,000 miles under average conditions, but the other tyre was worn to this same extent after running only 335 miles at an average of 90 miles per hour on a racing track. Considering fast touring speeds, the rate of tread wear on tyres which average 50 miles per hour was found to be about 0.17 m.m. per 1,000 miles and this is about twice the rate of wear of tyres run at an average speed of 30 miles per hour. Above 65 miles per hour the increase in wear is very rapid. Excessive toe-in has a very bad effect and it has been found that a toe-in of an ⅛ of an inch should not be exceeded, otherwise the tyre will not last its full life. A tyre run with a toe-in of ½ inch was nearly worn out after 3,700 miles. Another with a toe-in of 1/16 inch has run 9,000 miles and is not yet nearly worn out.

Tests made for wheel slip with a motor cycle combination showed that on a cross country run at normal speeds there was a total slip of only 1½ per cent., but on a rough road a short run at 62 miles per hour gave a slip of 4½ per cent. By fiercely engaging the clutch for rapid acceleration a slip of 16 per cent. was obtained. In a similar ''getaway,'' measuring the slip on the first 33 yards only, it amounted to the very high figure of 48 per cent. If the slip be doubled, four times the amount of tread rubber will be worn away.

It is of interest to note how the wear of tyres varies according to the season of the year, partly due to the temperature and partly due to the wetness or dryness. For instance, the rate of wear of a large quantity of tyres in July of three successive years was 9/10 m.m. per thousand miles, while in January of the corresponding years, it was only 6/10 m.m. per thousand miles.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

THE HOT WEATHER BOGEY.

Baby enjoys the hot weather. There is nothing that pleases him better than to exercise his limbs freely in the most scanty attire, or in nothing at all, unless it is to splash about in a tub of tepid water. He is released from the burden of clothing, which oppressed him in the cold season, and cramped his movements.

Hot weather is healthy. The three coolest States of Australia have the highest infantile mortality. Last year Queensland had the lowest. That hot weather is dangerous to infant life is just a silly bogey.

Of course, special care is needed during the hot season in some respects. If you overclothe baby he will suffer from prickly heat. This is caused by excessive sweating when the sweat is not allowed to evaporate freely. Dress him in cool singlets—not in heavy woollens. Outside the singlet he should wear only the coolest of airy garments, and these should be taken off when he is indoors. Do not torment him with flannel binders. Prickly heat is worst on his back, because he lies on that, and the perspiration cannot dry off quickly. Let him lie on cool sheets, or better still, on cool vegetable mats. Turn him over sometimes, when he is asleep, and train him to lie on his side.

He does not now need so much heat-forming food. Give him rather less solid food, rather less sugar and fat (clinic emulsion for instance). But he needs more fluid, so let him drink as much boiled water as he likes between his meals. Do not forget that this is necessary for babies who are on the breast.

Boil Baby's Milk.

During warm weather all kinds of bacteria grow very rapidly, and so food does not keep, but undergoes changes, which make it unwholesome, and sometimes even dangerous. Especially is this true of milk. You know how quickly it goes sour. Unfortunately, it changes in other ways, which are more harmful than sourness. Therefore, be careful to boil your milk as soon as you get it; then keep it in a cool place carefully protected from flies. Pasteurised milk delivered in bottles does not need to be boiled. It will keep good for twenty-four hours on ice; but otherwise, if you have only one delivery, you will need to boil it within twelve hours if it is to be kept till next morning. Should your milk be stale or dirty before it is boiled, it will cause loose motions. When good, fresh milk cannot be had, you may use dried milk (Glaxo or Lactogen).

Diarrhoea.

Loose motions or diarrhœa is common in warm weather, and needs careful watchfulness. Should your baby suffer from this, you must at once stop giving him milk or any kind of food except very thin barley-water slightly sweetened. Let him drink as much as he wants; he will be thirsty, but not hungry. It may be even necessary to take him off the breast for one or two days. You may also give him one teaspoonful of castor oil to clear out any undigested food. Within twenty-four or forty-eight hours he should be much better, and probably a little hungry. A little breast milk may then be given, or you may then give him whey made with junket tablets, but the whey must first be brought to the boil. If he is over nine months, you may also give him some arrowroot, cornflour, or sago boiled with water without milk, or a finger of bread baked hard and crisp. Do not give him milk foods until his motions become natural, and give the milk at first in very small quantity, increasing it gradually.

By this treatment attacks of simple diarrhœa are usually easily cured. But it is very different with diarrhœa caused by infectious bacteria. Of these the most dangerous is dysentery. We told you last month how to guard against this epidemic, which attacks us every year in the early summer during the fly season—not, be it observed in the hottest time of the year, when the epidemic usually subsides.

Babies Killed by Ignorance.

We hope that our advice will be carefully observed, and that it will save many lives. The cause of the increased sickness and more frequent deaths among our infants during the summer is not the hot weather; it is the prevalence of dysentery and other bowel infections during this season. This infection occurs so frequently because mothers do not know how the dysentery bacilli get into their babies. Babies have died from want of knowledge.

THE PREMATURE BABY.

Most people know that when a baby is premature—that is, born before its time—it needs special care and treatment, but many have little knowledge of the special points which require immediate attention, if the child is to have a reasonable chance of survival.

If even half of the premature babies who are born each year in Queensland could live, there would be a marked lowering of the infantile death rate. Of all the deaths that take place in children under one year, about half occur during the first month of life. A large number of these children are either premature, or feeble, weakly infants, who should receive the same care as those who are premature. Such cases should always be under the care of a doctor.

If a baby is under 5 lb. when born, it is better to treat it as premature, to get satisfactory results. Those under 2½ or 3 lb. in weight rarely survive, though cases are on record where infants of less than 2 lb. have lived and developed into healthy children.

In appearance, the premature baby differs from the normal baby in more than size. The little body is very soft and limp; the skin wrinkled and downy, and because it is thinner than usual, it looks redder. All the muscles are weak, and the infant is often too feeble to suck. The cry is feeble and suggestive of the mewing of a young kitten. Often the baby cannot cry at all. Such cases need special care from the moment of birth.

FOUR IMPORTANT POINTS.

There are four points which should receive attention. They are prevention of chilling of the baby (that is most important and must come first): careful feeding, on mothers milk; careful avoidance of risk of infection; and avoidance of all unnecessary handling.

Prevention of Chilling.

Because the baby has come too soon into the world, the power of the body to manufacture and regulate its heat is not yet properly developed, and the temperature can quickly fall to a dangerously low level. A premature baby who is allowed to become thoroughly chilled soon after birth rarely lives. When we know that an infant is to be born prematurely, special preparation should always be made to prevent this chilling. A cot should be prepared and thoroughly warmed for its reception. Baby must not be bathed, nor yet even oiled, but as soon as it is born, wrapped in warmed cotton wool or soft flannel, and placed in the cot. At the end of six or eight hours it can be oiled over with warm olive oil and cotton-wool swabs, taking care to do it as quickly as possible and with as little handling of the child as possible. Very frail babies should be oiled without being removed from their cots, and the cot should be placed in a warm, sheltered place, and protected from all draughts by screens while this is being done. In hospitals, special cots are kept for premature babies. These are not always available in private homes, but a very useful and comfortable cot can be quickly improvised. A dress basket does admirably; failing this, the family clothes basket can be used, or a drawer out of a chest of drawers can be made to serve, though this last is not deep enough to be as suitable as the two previously mentioned. To prepare the improvised cot: if the weather is cold, first line it with paper—newspaper does quite well—then throw a blanket over it, covering it completely. Next, in the bottom of the basket and over the blanket, place a pillow to serve as a mattress. A pillow-slip or flannelette napkin serves as a sheet, and a small, folded, soft napkin as a pillow. On this the baby, wrapped in cotton wool and its soft woollen shawl, is placed with a baby blanket over it. The enveloping blanket is now drawn from each side across the cot, but this is not enough warmth for the premature baby. Hot water bags or bottles will be required. Rubber bags are best, but any bottles can be made to serve. In cold weather three are required, in warm weather two will probably be enough. One bag is placed under the mattress at the foot of the bed, and the others at the sides, not close to baby's body but lying on edge, tucked down between the enveloping blanket and the mattress. For the bottle at the foot of the bed use two-thirds boiling water and one-third cold water; for the side bottles use equal parts cold and boiling water. The bags must be refilled in rotation, one every hour in cold weather, less often in summer. Give baby plenty of fresh air—keep him in a well-ventilated room. In our Queensland climate, the air even in winter is not cold enough to hurt the premature baby, provided his bed is kept properly warm. Guard against over-heating. It is wise to have a dairy thermometer in the bed, and this should register between 85 and 95 deg. Fahr.; never more, or it will do baby harm. Gradually decrease the artificial heat as baby's condition improves. Oil baby every second day, taking the same precautions as for the first oiling. Do not put him in the bath until he weighs 5 lb. As he improves, commence with sponging, at first only hands and face, and gradually increase until he is being fully sponged, and later, bathed.

Careful Feeding.

For our premature baby, mother's milk is practically essential. Few survive without it. If circumstances make it impossible for the mother to feed her own baby, endeavour to get milk from another healthy mother. A relative can sometimes be found who has a baby of her own, and so is able to supply some breast milk. It does not matter at all if the foster-mother's milk baby is six or even more months old. It will not hurt the premature baby, but it may sometimes be necessary at first to dilute the milk with equal parts of water. If the foster-mother is a stranger, or there is any doubt about her health, boil the milk before giving it to baby. Nothing but plain, boiled water should be given to the premature baby for the first twenty-four or thirty-six hours. After that it must have food. It is impossible to say exactly how much the child should have or how frequently it should be fed. Some strong premature babies can suck the breast and get all they need. Others are quite unable to suck, and at first almost unable to swallow. Such cases must be fed with a pipette or eye dropper, and the milk must be expressed from the mother's breasts and fed to the child. If baby can take very little, say only one or two teaspoonsful at a time, he must be fed every two hours, with one night interval of three hours. With a feeble baby, it may take twenty minutes or even more to take even this small quantity. Increase the interval between feeds by a quarter of an hour at a time, to three hours, with one longer night interval, as soon as baby can take a larger quantity at a feed. Also substitute a small feeding-bottle for the eye dropper as soon as the child shows signs of sucking.

If mother's milk is unprocurable, whey may be tried, at first diluted to half strength, until advice can be obtained from a doctor or welfare nurse. A rough estimate of the amount of food that a premature baby should take, is 3 oz. for each pound of body weight. So if baby weighs 3 lb., try to give him 9 oz. of fluid daily. He may take much less at first.

Prevention of Infection.

As a result of being undeveloped and weak, baby is very susceptible to infection. Because he is so tiny, he is generally an object of interest and curiosity to neighbours and friends who come to visit him. In his interest this should not be allowed. Even a common cold in an attendant or visitor can easily lead to a fatal pneumonia in a premature baby. For this reason isolate him as far as possible. Have no unnecessary visitors and as few attendants as can be. If mother or nurse develops a cold, she should tie a piece of gauze over her nose and mouth while attending to the child.

Avoidance of Handling.

Handling is very harmful to the feeble premature baby. Until he shows signs of increasing strength, do not remove him from his cot while feeding or oiling him. Handle as little and as gently as possible while changing him; but change of position is necessary; turn him from one side to the other every four hours. The care of a frail, premature baby entails not only much care and trouble, but a high degree of skill. The successful rearing of such an infant is justly a source of pride to mother or nurse.

FOR THE COUNTRY GIRL—SOME OPPORTUNITIES.

"What superior opportunities girls in the cities have!" sighs the country girl. "In what line?" you ask. "Opportunities for education, money-making, fun." It is true that salaried positions are more numerous in the city than in the country, but the country girl has many more ways of earning odd shillings. For, primarily, she has space—a necessity for growing anything, vegetable or animal, and the products of the farm are in never-ceasing demand. Butter, eggs, honey, preserves and jellies, chickens and vegetables are always marketable. Ingenuity will make the marketing exceedingly profitable.

Develop Originality.

Develop your originality. It is originality which makes one potent or impotent, and originality will grow if stimulated. Do not say: "But I am too far from a market to raise pigeons," or "there are no rare butterflies in our neighbourhood," but think out your own environment; study your own ability; imagine and create an opportunity for yourself.

Of course, in higher and specialised lines, the city girl may become educated more easily than her country cousin. But even when it is impossible for you to leave the farm, you can accomplish much in any desired line.

All Universities are giving more and more attention to extension work, and you can go far towards a degree without ever seeing the college buildings. And all their help you are entitled to. The State University is your University; your taxes support it.

Courses will be laid out for you, reading suggested, and books loaned.

Aid and inspiration may be had for the asking from the city and travelling libraries. Outline courses will be sent you which contain the ability of experts. And there are correspondence schools whose text-books are often by masters in their lines.

One girl I know has obtained very fine instruction in music by organising a class for a teacher from a nearby town. The teacher comes to her home one day in the week, and there gives lessons to all of the pupils. The girl who organised the class pays nothing for her own lessons, but gives the teacher the use of her home, and furnishes her luncheon.

Many teachers of drawing, music, and dancing take long annual vacations. Perhaps an advertisement in some city paper that board on the farm during the summer would be given in exchange for one lesson a day, would get a response. In such a case, you could probably "sub-sell" three of the lessons each week and take three yourself.

But you will say that you want sometimes to get away from the country; to be in the city; to see its plays and to be part of its merry gaiety.

Of course you do, just as your city friends long ardently for the country. So let us consider ways of earning money for trips to the city, and delightful tastes of its pulsing life.

As a modification of the summer boarder idea, a girl might make a fancy little sum by boarding and caring for the children of people who wish to travel in summer. Children are so enthusiastic over farm life that they practically entertain themselves. And, being clad with extreme simplicity, they are very little trouble.

If your home has an attractive site, especially if it offers boating or fishing, arrange and advertise a camping ground. You may either charge a small fee for tenting privileges, or omit the fee to secure an easy and profitable market for milk, butter, eggs, vegetables, preserves, home-made bread, and pies.

Home Industry.

Pickles, jellies, and candied fruits, when of superior quality, command high prices and show a large percentage of profit when the fruit is home grown. To save a great proportion of the work during the summer months, defer the jelly and jam making until the autumn. That is, cook the berries and other fruit sufficiently, and can them without sugar. Later make them into jellies, jams, and so on as indicated by the demand. The freshly made jams and jellies have a certain charm of flavour that is lacking in those that have stood very long. The deferring of part of the labour is a great help to the farm girl, for summer is a busy season on the land, and, at that time, outside help seems to be non-existent.

I have an idea, however, that an advertisement in a city paper would bring answers from girls who are not otherwise domestic helps, who would be willing to work several hours each day in exchange for board. Two such girls would be a decided help, and might be pleasurable friends as well.

Roadside Tea-houses.

Many a profitable tea and luncheon place has been developed from very small beginnings by country lasses. In these days of the far-going auto, there is increasing demand for such places. Here, naturally, environment should determine the choice of food offered, but in no case should an effort be made to compete with the city. Simplicity should dominate. Near the beach fish and oysters may be profitably served, and many little oddities of weed and shell life sold. On the inland farm the dairy products and vegetable salads are suitable, and a good trade may often be built up in hampers of fresh vegetables, thus eliminating the middleman bugaboo . . .

The gathering of medicinal herbs, the raising of cats and dogs, of rabbits, of mushrooms, pigeons, of poultry, and of bees, all offer suitable pursuits for the country girls and her small brothers. And, should she make a great success in any line of endeavour, she can add a little to her store of pin-money by detailing that success in simple and effective language for the farm papers, which are always in the market for accounts of actual and practical money-making experiences.

All these merely by way of suggestion. If none of them fits your case or abilities exactly, vary them, make them fit, or invent other opportunities—find them rather, for opportunities in one shape or another generally abound, if one has the eyes to see. It is largely a matter of gumption, and the girl who lacks that, could not succeed at anything, even though the whole plan were "cut and dried for her." "God helps those who help themselves."—ELIZABETH WHITFORD in the "California Cultivator" (adapted).

Farm Notes for February.

Reference was made in last month's Notes to the necessity for early preparation of the soil for winter cereals, and to the adoption of a system of thorough cultivation in order to retain moisture in the subsoil for the use of crops intended to be raised during the season. The importance of the subject, and its bearing in relation to prospective crop yields, is made the excuse for this reiteration.

Special attention should be given to increasing the area under lucerne (broadleaf Hunter River), wherever this valuable crop will grow. Its permanent nature warrants the preparation of a thorough tilth and seed bed, and the cleansing of the land, prior to sowing the seed, of all foreign growths likely to interfere with the establishment and progress of the crop. Late in March or early in April is a seasonable period to make the first sowing providing all things are favourable to a good germination of seed.

Dairymen would be well advised to practise the raising of a continuity of fodder crops to meet the natural periods of grass shortage, and to keep up supplies of succulent fodder to maintain their milch cows in a state of production.

Many summer and autumn growing crops can still be planted for fodder and ensilage purposes. February also marks an important period as far as winter fodder crops are concerned, as the first sowings of both skinless and cape barley may be made at the latter end of the month in cool districts. Quick-growing crops of the former description, suitable for coastal districts and localities where early frosts are not expected, are Soudan grass, Japanese and French millet, white panicum, liberty millet, and similar kinds belonging to the Setaria family. Catch crops of Japanese and liberty millet may also be sown early in the month in cooler parts of the State, but the risk of early frosts has to be taken.

Maize and sorghums can still be planted as fodder and ensilage crops in coastal districts. In both coastal and inland areas, where dependence is placed largely on a bulky crop for cutting and feeding to milch cows in May and June, attention should be given to Planters' Friend (so-called Imphee) and to Orange cane. These crops require well-worked and manured land; the practice of broadcasting seed for sowing at this particular season encourages not only a fine stalk but a density of growth, which in itself is sufficient to counteract to some extent the effect of frost.

In most agricultural districts where two distinct planting seasons prevail, the present month is an excellent time for putting in potatoes. This crop responds to good treatment, and best results are obtainable on soils which have been previously well prepared. The selection of good "seed" and its treatment against the possible presence of spores of fungoid diseases is imperative. For this purpose a solution of 1 pint of formalin (40 per cent. strength) to 24 gallons of water should be made up, and the potatoes immersed for one hour immediately prior to planting the tubers. Bags and containers of all kinds should also be treated, as an additional precaution. "Irish Blight" has wrought havoc at times in some districts, and can only be checked by adopting preventive measures and spraying the crops soon after the plants appear above the ground. Full particulars on the preparation of suitable mixtures for this purpose are obtainable on application to the Department of Agriculture, Brisbane.

Weeds of all kinds, which started into life under the recent favourable growing conditions, should be kept in check amongst growing crops; otherwise yields are likely to be seriously discounted. The younger the weeds the easier they are to destroy. Maize and other "hoed" crops will benefit by systematic cultivation. Where they are advanced, and the root system well developed, the cultivation should be as shallow as possible consistent with the work of weed destruction.

First sowings may now be made of swede and other field turnips. Drilling is preferable to broadcasting, so as to admit of horse-hoe cultivation between the drills, and the thinning out of the plants to suitable distances to allow for unrestricted development. Turnips respond to the application of superphosphate; 2 cwt. per acre is a fair average quantity to use when applied direct to the drills.

Where pig raising is practised, land should be well manured and put into good tilth in anticipation of sowing rape, swedes, mangels, field cabbage, and field peas during March, April, and May.

Orchard Notes for February.

THE COASTAL DISTRICTS.

February in coastal Queensland is frequently a wet month; and, as the air is often heavy with moisture and very oppressive, plant growth of all kinds is rampant, and orchards and plantations are apt to get somewhat out of hand, as it is not always possible to keep weed growth in check by means of cultivation. At the same time, the excessive growth provides a large quantity of organic matter which, when it rots, tends to keep up the supply of humus in the soil, so that, although the property looks unkempt, the fruit-producing trees and plants are not suffering, and the land is eventually benefited. When the weed growth is excessive and there is a danger of the weeds seeding, it is a good plan to cut down the growth with a fern hook or brush scythe and allow it to remain on the ground and rot as it will thereby prevent the soil from washing, and when the land is worked by horse power or chipped by hand it will be turned into the soil. This is about the most satisfactory way of dealing with excessive weed growth, especially in banana plantations, many of which are worked entirely by hand.

The main crop of smooth leaf pineapples will be ready for canning, and great care must be taken to see that the fruit is sent from the plantation to the cannery with the least possible delay and in the best possible condition. The only way in which the canners can build up a reputation for Queensland canned pineapples is for them to turn out nothing but a high-class article. To do this they must have good fruit, fresh, and in the best of condition.

The fruit should be about half-coloured, the flesh yellowish, not white, of good flavour, and the juice high in sugar content. Over-ripe fruit and under-ripe fruit are unfit for canning, as the former has lost its flavour and has become "winey," while the latter is deficient in colour, flavour, and sugar content.

For the 30 or 32 oz. can, fruit of not less than 5 in. in diameter is required, in order that the slices will fit the can; but smaller fruit, that must not be less than 4 in. or, better still, 4½ in. in diameter, and cylindrical, not tapering, can be used for the 20-22 oz. can.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, the individual fruit should be well filled and not partly developed. If the fruit is over-ripe it will not carry well, and is apt to reach its destination in an unsaleable condition.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees that have recently been thinned out, and these must be removed. Where there are facilities for cyanidings, this is a good time to carry out the work, as fruit treated now will keep clean and free from scales till it is ready to market. Citrus trees can be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees, as they transplant well at this period of the year.

A few late grapes and mangoes will ripen during the month, and, in respect to the latter, it is very important to see that no fly-infested fruit is allowed to lie on the ground but that it is gathered regularly and destroyed. Unless this is done, there is every probability of the early citrus fruits being attacked by flies bred out from the infested mangoes.

Strawberries may be planted towards the end of the month, and, if early ripening fruit is desired, care must be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be brought into a state of thorough tilth by being well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertiliser, as strawberries require plenty of food and pay well for extra care and attention.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of peaches and plums, and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Granite Belt, and the advice given in these notes for the two previous months, with regard to handling, grading, packing, and marketing is again emphasised, as it is very bad policy to go to all the trouble of growing fruit and then, when it is ready to market, not to put it up in a way that will attract buyers.

Extra trouble taken with fruit pays every time. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market. Expenses connected with the marketing of fruit are now so high, owing to the increased cost of cases, freight, and selling charges, that it is folly to attempt to market rubbish.

During the early part of the month it will be necessary to keep a careful watch on the crop of late apples in order to see that they are not attacked by codlin moths. If there is the slightest indication of danger, a further spraying with arsenate of lead will be necessary, as the fruit that has previously escaped injury is usually that which suffers the most.

Fruit fly must also be systematically fought wherever and whenever found, and no infested fruit must be allowed to lie about on the ground.

Grapes will be ready for market, and in the case of this fruit the greatest care in handling and packing is necessary. The fruit should never be packed wet, and, if possible, it is an excellent plan to let the stems wilt for a day at least before packing. This tends to tighten the hold of the individual berries on the stem and thus prevent their falling off.

In the western districts winemaking will be in progress. Here again care is necessary, as the better the condition in which the fruit can be brought to the press the better the prospect of producing a high-class wine.

Where necessary and possible citrus trees should be given a good irrigation, as this will carry on the fruit till maturity, provided it is followed up by systematic cultivation so as to retain a sufficient supply of moisture in the soil.

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	December, 1929.		January, 1930.		MOONRISE	
					Dec., 1929.	Jan., 1930.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	4.50	6 32	5.2	6.48	a.m. 4.24	a.m. 5 35
2	4.50	6 32	5 2	6.48	5.9	6.28
3	4.50	6.33	5 3	6.48	5.57	7.23
4	4.50	6 34	5 4	6.49	6.48	8 19
5	4.50	6 35	5 4	6.49	7.42	9.14
6	4.50	6 35	5.5	6 49	8.37	10.9
7	4.50	6.36	5 6	6.50	9.31	11 2
8	4 51	6 37	5.7	6.50	10.26	11.57
9	4 51	6.37	5.8	6.50	11.20	p.m. 12.55
10	4 52	6 38	5 9	6.50	p.m. 12 16	1.56
11	4 52	6.38	5.10	6.50	1.11	3.2
12	4.53	6 39	5 11	6.50	2.9	4.11
13	4.53	6 39	5 12	6.50	3.10	5.19
14	4.54	6.40	5 13	6.50	4.17	6 27
15	4.54	6.40	5.14	6.50	5.27	7.29
16	4.55	6.41	5.15	6.49	6.36	8.22
17	4.55	6.41	5.15	6.49	7.46	9.5
18	4.55	6.42	5.16	6.49	8.50	9.41
19	4.56	6.43	5.17	6.48	9.47	10.14
20	4.56	6.44	5.18	6.48	10.30	10.46
21	4.56	6.44	5.19	6.48	11.9	11.18
22	4 57	6.45	5.20	6 47	11.43	11.50
23	4 57	6.45	5.21	6 47	...	...
24	4.58	6.46	5.21	6.47	a.m. 12.16	a.m. 12.26
25	4.58	6.46	5.22	6.46	12.46	1.5
26	4 59	6 46	5 23	6.46	1.18	1.50
27	4 59	6.47	5.24	6 46	1.51	2.39
28	5 0	6.47	5.24	6.46	2.27	3.31
29	5.0	6.47	5.25	6.45	3.6	4.24
30	5.1	6.48	5.25	6.45	3.52	5.19
31	5.2	6.48	5.26	6.45	4.43	6.14

Phases of the Moon, Occultations, &c.

8 Jan.	☾ First Quarter	1 11 p.m.
15 ,,	○ Full Moon	8 21 a.m.
22 ,,	☽ Last Quarter	2 7 a.m.
30 ,,	● New Moon	5 7 a.m.

Apogee, 2nd January, at 1·48 a.m.
Perigee, 15th January, at 10·24 a.m.
Apogee, 29th January, at 2·12 a.m.

On the 3rd the earth will make her nearest approach to the Sun from which its distance will be 91,300,000 miles.

The planets Venus, Mars, and Saturn will be apparently close to one another on the morning of the 3rd; but as they will rise only about one half-hour before the Sun they will be lost in the coming daylight.

On the 6th Mercury will be at its greatest distance, 19 degrees on the east side of the Sun.

The occultation of Tota Geminorum by the Moon, on the 14th instant, which will take place about 11 p.m., will not be visible north of Mackay, where the star will appear very near the northern edge of the Moon. Through binoculars or telescope it will be interesting to watch the star apparently skirting the northern limb of the full Moon. In the southern half of Queensland the star will disappear behind the Moon sooner further south and its reappearance will be proportionately retarded.

On the evening of the 27th the Moon will be passing from the west to the east side of Saturn, but 5 degrees further south. Although this will occur near midday the Moon will be visible in the north-west and Saturn can be brought into view with binoculars.

The Moon will be in the constellation Capricornus from the 1st to the 4th; in Aquarius from the 4th to the 6th; in Pisces and Cetus from the 6th to the 9th; in Aries from the 9th to the 11th; in Taurus and Auriga from the 11th to the 14th; in Gemini from the 14th to the 15th; in Cancer from the 15th to the 17th; in Leo from the 17th to the 18th; in Virgo from the 18th to the 22nd; in Libra from the 22nd to the 24th; in Scorpio and Orphineus from 24th to the 26th; in Sagittarius from the 26th to the 27th—New Moon on the 30th.

As the Southern Cross will be at the lowest part of its daily circle, about 6 p.m. in the beginning of the month and will not reach its most eastern position (ix.) till midnight, it will barely be coming into view in the south-east at 9 p.m. with its head slanting downwards to the left. Reaching these positions 4 minutes earlier each evening 2 hours will be gained by the end of the month.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXIII. 1 FEBRUARY, 1930. PART 2.

Event and Comment.

Malting Barley.

WHEN on the Darling Downs on a tour of inspection through the wheat areas recently, Mr. J. D. Annand, M.L.A., interested the Minister of Agriculture and Stock, Mr. Harry F. Walker, in the practicability of extending the cultivation of malting barley. After due inquiry, Mr. Walker arranged a conference, at which growers, malsters, and brewers were represented, for the purpose of discussing the disposal of the present season's surplus and the possibility of arriving at a working arrangement in respect of future crops that would be satisfactory to all parties. As a result of this conference and subsequent negotiations, the Minister announced recently that he was in a position to state the nature of a possible arrangement which it was proposed to submit to the growers for their consideration.

The production of malting barley in Queensland over a period of five years averages 69,000 bushels, while the Queensland consumption of malt is from 200,000 to 250,000 bushels. The capacity of the existing operating maltings is approximately 70,000 bushels, but the idle plant at Toowoomba, at present owned by the Wheat Board, has a capacity of 130,000 bushels. The operating maltings have already arranged for their current grain requirements, and it is estimated by growers' representatives that approximately 60,000 bushels of this season's crop remain in growers' hands and for which there is no market. Queensland can, however, consume this barley if it is malted, and if the idle maltings are again brought into operation the State's malting capacity would be approximately equal to our malt needs and a trebling of the production of barley would be justified.

Proposed Barley Board.

SUBJECT to the concurrence of growers, the Government is prepared to constitute a Barley Board under the Marketing Act. An understanding has been reached with the Wheat Board whereby the maltings premises at Toowoomba will be made available to the proposed Barley Board for the malting of the current season's surplus barley free of charge, the new board to have the option of acquiring the premises from the Wheat Board at the end of the present season. The Government will also assist the Wheat Board with the finance required to put the idle maltings in order for treating the current season's crop. An apportionment of this expenditure will be made as between the Wheat Board and the proposed Barley Board in a manner which will be announced in due course. Mr. Devoy, of Castlemaine-Perkins Limited, has agreed to make the services of his head malster, Mr. Redwood, who has had a long experience of malting under Queensland conditions, available to the new board. An offer has been secured from Messrs. Redwood Brothers to malt the barley under contract at the rate of 2s. 4d. per bushel. The Queensland Brewery Company and the Castlemaine-Perkins Company have agreed to purchase the greater portion of the resultant malt, and negotiations are proceeding with the other Queensland breweries. Subject to all these arrangements being consummated by the proposed Barley Board, the Government will place its guarantee behind the contracts between the several parties, and a first advance of 3s. 6d. per bushel of graded barley net at country station can be paid to growers at time of delivery. The Government will also arrange with the Commonwealth Bank for the necessary funds for the board for malting costs, working and other expenses. If matters turn out as anticipated the final return to growers should be an additional 6d. or 9d. per bushel, making a total payment of 4s. or 4s. 3d.

Extension of Barley Growing.

NEGOTIATIONS are in train with the breweries as to the quantities they will take next year. Before the planting season (about March or April next) Mr. Walker expects to be able to announce the guaranteed first advance for a given maximum quantity of barley which will be available to growers in December next, from the crop of the 1930 planting. If the negotiations at present pending turn out satisfactorily it will probably be possible to make the same or a slightly larger advance as is proposed for this season. In establishing new industries and reviving old ones, the danger of over-production for the market available has to be avoided. The Minister proposes, therefore, that the board, if constituted, shall be vested with authority to allocate acreages among growers in the first years of operation; such authority to be exercised in the event of there being any indication of a tendency to over-produce for existing markets.

Proposed Grain Board.

IF approved by the interests concerned, Mr. Walker is prepared to arrange for the merging of the Wheat Board, the Barley Board, and the Canary Seed Board, and their being reconstituted as a Grain Board with a separate committee and separate funds and accounting for each product. Such an arrangement would probably make for economy in administration and co-ordination of effort in the handling, on behalf of the farmers, of the Darling Downs grain crops.

Grain Growers' Responsibility.

IT is emphasised, however, that the question of the desirability or otherwise of establishing organised marketing on these lines is one entirely for the growers to decide. The Government does not wish to thrust any particular scheme upon growers. The Minister was requested by Darling Downs interests to see what could be done to relieve the barley growers of their difficulty and to get the industry on its feet again. Having set out the fundamental facts and also the extent of the assistance which the Government is prepared to give, the matter is left entirely to the interests concerned; but on the basis of the arrangements which the Government has been able to make, it seems that an excellent opportunity now exists for further rural development.

Social Aspects of Agriculture.

SOME time ago in the course of a public address in Melbourne, Sir G. A. Julius, Chairman of the Council for Scientific and Industrial Research, expressed some very interesting thoughts on some of the problems of Australian industry. Discussing some of the social aspects of agriculture, he reminded us that the proportion of farmers to our total population is undoubtedly undergoing a rapid decline. There are many reasons for this, and most of them are quite obvious to working farmers. But, as Sir George points out, if this is a reflection of increasing productivity per worker and progressive elimination of the unfit, it is eminently desirable, but in so far as it represents a falling off in our ability to sell our farm products in foreign markets, the case is not so clear. Other and older countries are experiencing the same decline, in fact it is a recognised world-wide tendency of modern life. Sooner or later, however, a reaction must come; the social amenities and other advantages of country life must prove an irresistible attraction to, probably, even the next generation. Modern discoveries and inventions will all be factors in the improvement of our rural social conditions. Sir G. A. Julius, however, takes a serious view of the present tendency of our rural population to forsake the country and its simpler life for the high and bright lights of the city. He says:—

> From the social point of view, there are potentialities in rural life which nothing else can supply. Farming is the one great industry, or group of industries, still remaining, in which the young man of small means can undertake an independent self-reliant type of life.
>
> It is perhaps not too much to say that the more farms a country can keep busy and prosperous, the sounder will be its social structure.
>
> The peculiar genius of our people traces back to pioneer life. The sturdy individualism which plagues the farmer in some directions is, nevertheless, a quality devoutly to be guarded.
>
> The opportunity to live by one's own direction, to choose a somewhat ill rewarded independence, to remain at a task which calls for skill, care, and judgment, and is inexhaustible in its possibilities for experimental study, is not lightly to be lost. To many men work of this sort is essential to happiness, and the nation needs just such men. The process of attrition of agriculture, which is now going on, is a matter about which we may well fell deep concern, and which calls for the earnest application of constructive statesmanship.
>
> The social aspects of the agricultural problem are by no means confined to the farming population. We must take thought of the place which agriculture is to occupy in the nation's future economy, of the relations between rural and urban populations, of the type of civilisation which we are developing, and how we might mould it nearer to fundamental human ideals.
>
> Shall we permit agriculture to shrink to the status of a minor industry? Is there virtue in having a population rooted in the soil, and distributed fairly evenly over the face of the country, or can we look on with equanimity as that population becomes concentrated in our cities? Are cities and coastal regions to be developed at the expense of back country?
>
> And what of the land, is our heritage to be handed on to future generations unimpaired? Shall we use the land conservatively, or waste it as foolish heirs of a fortune, to the use of which we have not been properly reared?
>
> Will the countryside of the future be green and fertile, or ugly, sere, and barren? To what extent is the denudation of the land of trees responsible for destructive floods and loss of surface soil, and are we not likely to rue the lack of timber we now so recklessly destroy?
>
> These, and similar questions, are not purely rhetorical; some of them open up questions of policy in which different opinions may be sincerely held, but some raise questions of fact to which there can be but one honest answer.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director of Sugar Experiment Stations.

In this series of articles is incorporated the material for a revision of a Bulletin on the Sugar Industry which Mr. Easterby prepared some years ago. Since then the industry has developed to such a degree, and the conditions have so altered, that a revision has become necessary. At the same time, it is recognised that the sugar industry in Queensland, which supplies 96 per cent. of Australian-grown sugar, is so many-sided and is governed by so many factors that it forms in itself a complicated study of no mean magnitude, and one with which it is impossible to deal completely in much less than a large volume. The industry has also in recent years become bound up closely with both Federal and State policy.

Mr. Easterby has covered his subject thoroughly under several heads, each of which he discusses with all possible brevity while retaining every essential of a very interesting narrative.

Part 1 was published in our January number, in which Mr. Easterby reviewed the development of the industry in pre-Federation days. In this instalment he continues that review.—ED.

PART II.

(a) Short History of the Industry prior to Federation.

(*Continued.*)

EVEN in the early days of the industry the consumption of sugar in Australia was greater than in any part of the world. About 1878 the consumption was 16 lb. a head greater than in England, which was the next highest. The high consumption in Australia was attributed to the average superior condition of the population, and to the custom at that time of giving rations in part payment of wages, which rations always included sugar.

In 1878 the consumption in Australia was 91,500 tons, and of this one-sixth was produced in Queensland, and one-twelfth by New South Wales. The remainder was imported, chiefly from Java and the Mauritius. Even at that period it was forecast that Queensland would eventually manufacture the whole of the requirements of Australia.

At this time there were no central mills as we understand the term to-day, but there were small mills who bought cane from settlers in addition to their own crops. Many of the larger plantations also bought cane from neighbouring farmers. The price paid in Mackay in 1879 was 11s. per ton of cane showing a density of 10 deg. Beaume, the millowner doing the cutting and carting. At Nerang, one millowner gave £12 10s. per acre for one-year-old cane and helped with the cutting and carting, while at Beenleigh up to £22 per acre was paid for two-year-old cane, the seller doing the harvesting and carting. Prices varied considerably, being regulated largely by the proportion of crushing power of the mills to the number of settlers in their immediate neighbourhood. In Bundaberg and Maryborough, many mills were simply crushing plants which sold the resulting juice to a central factory, to which it was pumped along pipe lines after being heavily limed. Some of the small mills found it profitable to so sell their juice, but the larger manufacturers found they could make sugar more profitably themselves. In 1878, there were sixty-eight mills in operation.

The idea of central mills, however, was kept well in the foreground, and numbers of articles were published advocating the idea and dwelling on the advantages the small growers would reap if the work of cultivating the cane were left in their hands while central mills purchased the cane and did the manufacturing. Mr. Angus Mackay, who was sent as Queensland's Commissioner to the Philadelphia Exhibition, was instructed by the Government to visit the West Indies and make inquiries into this system. On his return, his report, which was published, spoke highly of the advantages that central factories offered, and the agitation, backed up by this report, continued, and eventually resulted in the establishment of a number of central mills in this State, where farmers would not only carry on the growing of the cane but become shareholders in the mills, although the ideas at first were not strictly on co-operative lines.

1880 to 1890.

During this decade the production of sugar in tons varied from 16,660 to 68,924, and further small mills were erected in various parts of the State. It was early in this period that the Colonial Sugar Refining Company (established in 1855) began to turn its attention to Queensland, and purchased freehold land in the Mackay and Herbert River districts, and arrangements were made for the transfer from land owners in the vicinity (all conditional selections). Parliamentary authority had to be procured for this, the company undertaking to erect buildings and appliances for the manufacture of sugar, costing £200,000, and that this sum should be expended within five years. Accordingly, the Colonial Sugar Refining Company's Act of 1881 became law. Some of these conditional selections had been acquired at 5s. and 10s. per acre, and in the debate on the Bill it was stated that such lands were worth three times as much, figures which can be compared with their value to-day. The area of land so to be transferred amounted to 9,305 acres more or less, and if the company did not spend the £200,000 the lands were to be forfeited and revert to the Crown. In less than eight years after the passage of the Bill the company had a total of about 38,000 acres in its three plantations at Homebush, Victoria, and Goondi, about 6,800 acres being under cane, while in the 1888 season over 5,000 acres were actually harvested, cane from a further 1,000 acres being purchased by the company for treatment at its mills. At the end of that season the total capital invested by the company in Queensland was £624,000, of which about £220,000 represented the actual cost of the machinery on the three estates, almost the whole of the latter having been obtained from the United Kingdom.

In the early eighties a high price ruled for sugar, as much as £37 being obtained for first white sugar in 1882. Not long after, though, greatly reduced prices were in evidence owing to the rapid development of beet sugar in Europe, which was being bounty fed, and in 1885 and 1886 the prices were down to £20 per ton, and it was stated that all the plantations were operating at a loss, and at this time a number of small mills went under.

The subject of the establishment of Central Sugar Mills was not allowed to rest, and in Mackay the first steps were taken that ultimately led to the erection of a number of Central Mills. In November, 1885, a petition was presented to Parliament which subsequently led to the inauguration of the Central Mill system. The petition set forth the difficulties of cane farmers in being confined to mills of plantation owners, and made a powerful plea for assistance by stating that cane growing could be made a white man's industry. Mr. Thomas Pearce, then of Mackay, generally gets the credit for starting the movement which led to the erection of the Racecourse and North Eton Mills.

The Griffith Government in power at that time viewed black labour with little favour, and decided to make available a sum of £50,000 to groups of farmers at North Eton and Racecourse in the Mackay district to erect mills on conditions not greatly differing from those embodied in the subsequent Sugar Works Guarantee Act. These mills were expected to crush cane grown only by white labour, but it was soon found this could not at that time be put into practical effect.

The farmers agreed to take shares, but it was found that shareholders growing cane were receiving less than non-shareholders who supplied cane. The establishment of these two mills with the object of paying to the grower a higher price than he had been getting from the private planter, and having another aim, viz., the supplanting of coloured labour, was naturally not well received by the planters, who were exceedingly critical. The Colonial Sugar Refining Company, however, which had land at Homebush, near Mackay, and had erected a mill, now cut up their estate into moderate-sized farms, and the land was quickly taken up. The small farmer system thus began rapidly to come to the front, and a little later on the Sugar Works Guarantee Act gave further encouragement. It was soon recognised that this system had many advantages, and many of the larger planters began to cut up their holdings and sell farms to canegrowers.

The price of sugar still continued on the low side, and as Section II. of "*The Pacific Islanders Act of* 1885" provided that the importation of any more kanakas should cease at the end of 1890, this led to the cost of kanaka labour increasing, so that matters were not at all satisfactory. This was during the time of the Griffith Ministry, and when later a change of Government occurred it was determined to appoint a special Commission to make a full and searching inquiry into the general conditions of the industry.

This Commission, by its majority report found in 1889 that since 1883 sugars of all classes had fallen in price, and this was the principal reason for the depression; further, the cost of black labour had increased by more than 50 per cent. since 1883, and this, concurrent with the low price of sugar, had caused working expenses to exceed the value of the produce. The Central Mills of Racecourse and North Eton had not done well, and unless further subsidies were granted they must inevitably close. At the same time, the Commission recognised that it would be best that the business of growing sugar should be separated from manufacture. It was their opinion also that if all coloured labour was withdrawn the extinction of the industry must quickly follow, and they recommended that the introduction of this labour be permitted for some years longer than the period fixed for its ceasing. So in 1892 the section prohibiting the further entry of kanakas was repealed by a new Government, and kanaka labour thus re-established remained till the days of Federation.

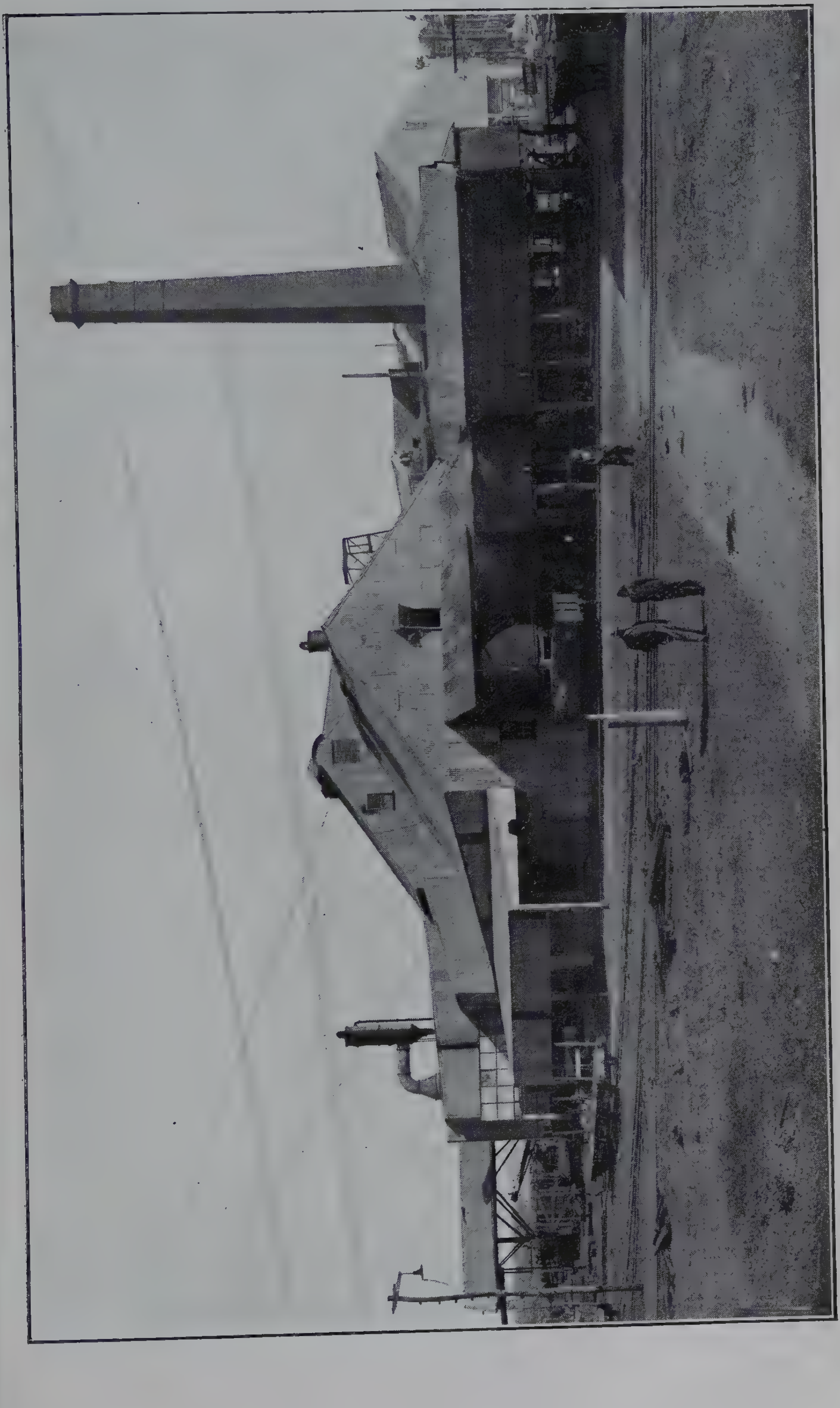

Plate 37.—Racecourse Mill, Mackay.

The next year, 1893, was an important one to the industry, as "*The Sugar Works Guarantee Act of* 1893" became law. By means of this measure the following Central Mills were ultimately erected:—

> Marian, Pleystowe, Plane Creek, Mackay; Proserpine, Proserpine; Mulgrave, Cairns; Mossman, Port Douglas district; Gin Gin, Bundaberg district; Isis, Childers; Mount Bauple, Maryborough district; Moreton, Nambour; Nerang, Southport district.

All these mills, except Nerang, are still working to-day.

No restriction was imposed by the Act with reference to the labour to be employed. It was asserted that this Act was the salvation of the Mackay district, and indirectly resulted in considerable revenue being derived by the State. It also caused the settlement of a large number of small growers in various parts of the colony.

Of course, the establishment of Central Mills was not unattended with difficulty, and it took much time before they were in actual operation. In some cases mills were erected before sufficient cane had been grown; other drawbacks were that landowners required too big a price for land, while some mills had to pay high rates for tramway easements.

In the case of the North Eton and Racecourse Mills which were erected before the passing of the Sugar Works Guarantee Act, provision was made for Government control, and the directors were divided into A directors (5) and B directors (4), the A directors being nominees of the Government. In the case of the mills under the Sugar Works Guarantee Act, the growers offered their land on mortgage as security for the advances made for building the mill and tramways. The Government held the deeds of the lands, but the growers had the sole management of the mills' affairs. The Act made no provision for Government control except in the case of a mill making default.

Reverting to the Racecourse Mill at Mackay, this was the first Central Mill erected to crush cane in Australia, and it was claimed that its foundation was the commencement of the White Australia movement in sugar. It was also the first mill owned and controlled by farmers to pay off its liability to the Government. In 1887, when the question of farmers' mills was first brought up, there were thirty-one mills in Mackay alone, and dissatisfaction was rife amongst the growers as to the treatment they received in the matter of price.

The price paid by Racecourse Mill at its first crushing was 12s. per ton for plant cane and 11s. for ratoons. The varieties principally grown at that time were Malabar, Striped Tanna, Black Tanna, Black Fiji, Meerah, and Rose Bamboo.

In 1891, the tonnage of cane required to make a ton of sugar at this mill had been reduced from 11½ tons to 9, and the sugar was sold to the Colonial Sugar Refining Company at an average price of £12 6s. 5½d. per ton, growers receiving 13s. 6d. per ton for cane. Finances, however, were at a pretty low ebb. The manager only received £250 per annum, and a proposal to increase his salary by £50 pretty nearly wrecked the directorate.

Under the 1893 Sugar Works Guarantee Act, about £500,000 was advanced by the Government for the erection of Central Mills. The original loans made by the Treasurer of Queensland were for a period of fifteen years, and valuations were made by a Government officer as provided by the Act. Provisions were embodied that if the mill made default the Treasurer could fix the price of cane and that the Treasurer could enter into the possession of the sugar works and all lands mortgaged.

Before the advent of the Central Sugar Mills, the old plantation methods with the kanakas resembled portions of the old world where the feudal system established communities whose schools, churches, and places of abode were practically under the control of one person. During the building of the numerous small mills artisans found employment for the time being, but after that the white staff of a plantation would consist only of overseers, clerks, and storekeepers. The capitalist alone was able to cope with pioneering difficulties in sugar-growing and manufacture. With the change in the conditions introduced by the Central Mills came a very decided alteration in the personnel of the people engaged in it. Instead of about fifty planters in a district, 800 small farmers took their place. The overseer of a gang of, say, sixty kanakas, was replaced by half a dozen farmers employing four kanakas each. The small men, in many cases labourers, who then entered on canegrowing were raised in the social scale to employers and finding themselves so, improved their opportunities. With the introduction of the Central Mill system, farmers became to some extent manufacturers and accustomed to supervising important businesses. These communities had their churches, schools, school of arts, sports and rifle clubs. The whole tendency was to eliminate the large landlord and create a type of reliant self-made men.

The kanaka days, however, were not without their humorous side. The boys would have feasts and sham fights, showing great proficiency in throwing grass spears. If they were late in turning out in the mornings they would often get a kick from an irate boss or overseer, but they mostly bore it smilingly. Their humpies or huts were in many cases built of grass and cane tops and trash, and it was not uncommon for a fire to happen at night time and then pandemonium would be let loose. There would be no hope of saving the structure, and the boys would be yelling like maniacs, and in many cases crying, with good reason as they often had money in the shape of notes hidden in the straw walls. When lined up for medical inspection it was amusing to hear the kanakas account of the various things that he considered were the matter with him or his "Mary" when he was married, and the dispenser at the mill hospital could tell many funny stories of life in the kanaka quarters. Occasionally, real battles would be fought between different island boys, and a death or two sometimes happened. The "boys" in many cases had horses, rode bicycles, held football and cricket matches, and generally, enjoyed life. On the whole they were well treated and had their protectors in the shape of Government officials who saw that they were properly looked after. There was scarcely any intermarriage with the whites. Of the half caste population in Queensland, in 1901 less than 2 per cent. were of Polynesian extraction, while the percentage of Chinese was almost 30. The total half caste population of the State at that time was 2,177, including aborigines. No kanakas were employed in the Central Sugar Mills.

The advent of the Central Mills led to a great decline in the number of private manufacturers, and to-day there are no sugar-mills operating owned by a single person.

Two of the small mills in the Beenleigh area are of the type of the old plantation small mills once so numerous in the colony of Queensland, and except that coloured labour is no longer employed and certain improvements in manufacture have been introduced, they would give a good idea of what the old mills were like.

[TO BE CONTINUED.]

Bureau of Sugar Experiment Stations.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report, for the period November to December, 1929, from the Entomologist at Meringa, Mr. E. Jarvis:—

Visit to Freshwater.

On 8th November the canefields in the vicinity of Jungara, Freshwater, Redlynch, &c., were searched for further evidence of the occurrence of *Ephysterus chersæa* Meyr. the small ''tineid moth borer'' of cane, which during September last was found to have attacked young ratoon shoots in this district. Apparently, however, Mr. McDougall was unable to find further signs of such damage.

Outwardly, the nature of the injury caused by *E. chersæa* corresponds in general appearance with that of our large noctuid moth borer (*Phragmatiphila truncata* Walk.), viz., destruction of the central or heart-leaves.

When first discovered and described by the present writer in the year 1919 it occurred at Pyramid, Meringa, Kamma, and Gordonvale, but has since spread to other widely separated localities. A full description of this moth and of its caterpillar, &c., will be found in Bulletin No. 11 of this office (Div. of Entomology, Bureau of Sug. Expt. Stations).

Attention has already been drawn to the fact that, not being an indigenous species, but having—in the opinion of Dr. Guy A. K. Marshall of the British Museum —been probably introduced into Australia from Natal, it is quite possible that, in the absence of its own natural enemies and other controlling factors, this insect might, in a new country like Australia, increase abnormally and become troublesome to our growers in the near future. In India this species is known to bore the stems of rice plants and various native grasses.

The Cane Beetle Situation at Meringa.

Up to date (17th December) no general emergence of cane beetles has taken place at Meringa, and we may reasonably assume that the prolonged dry conditions being still experienced here are likely to operate as a severe natural check on the numerical increase of this pest throughout drought-stricken areas.

It is interesting to record that the rainfall at Meringa during the last eight months of April to November has been only 7.88 inches; while the average for this period for the last forty years is 30.70 inches.

In addition to the beetle or imago condition of this cockchafer having been adversely affected by such climatic conditions. other controlling factors happen to have operated this year as a hindrance to normal development of its pupæ in the soil, so that around Meringa, at any rate, little damage should be experienced from grubs of this pest during the coming season.

Greyback cane beetles, however, made their appearance as usual at Gordonvale, Babinda, and other places early in November, when they were observed by the writer flying freely to electric lights in the immediate vicinity of the Mulgrave mill. At the residence of the electrician, Mr. F. P. Bell, where numerous specimens of these cockchafers were attracted to veranda lights of about 100 candle power, additional evidence was afforded in connection with the phototropic reaction of this species. Response to such light was at first of a very positive nature, the beetles being violently attracted, although often failing to reach their objective owing to ill-directed flight. In such cases they would fall to the ground, and, after crawling with rapid shambling motion for a few seconds. mount upwards and again endeavour to reach the centre of illumination. Such positive activity, however, generally lasted but a minute or so, the beetle then becoming quite motionless and unresponsive to phototropic influences.

This sudden reaction appeared very remarkable when occurring in insects which a moment before had been all aquiver with intense desire to plunge into the midst of such brightness.

It was noticed, too, that specimens while in this sleepy condition would remain without movement for hour after hour, although in some instances chancing to be settled only 3 or 4 inches away from an electric lamp.

Reaction of this nature would appear to be very similar to that induced by sunlight, seeing that these cockchafers rest in the daytime on the leaves of their feeding-trees, at which times they are usually in a torpid state and more or less motionless.

Distribution of Tachinid Flies.

Several liberations of this useful dipterous parasite (*Ceromasia sphenophori*) have been made during the last few weeks in the Goondi area. In each case, the living flies were taken to the borer-infested field in glass tubes by Mr. W. A. McDougall, of this Experiment Station, and liberated at spots where borers were most in evidence.

The various farms selected for further liberations are being planned by Mr. R. N. MacLean, the Field Chemist at Goondi mill; our intention being to collaborate with him in the work of systematically distributing these parasites throughout this canegrowing district.

Visit to the Herbert River.

On the 9th instant Mr. McDougall was instructed to proceed to Ingham, and, whilst there, to get into touch with the representatives of the various canegrowers' branches at Cordelia, Upper Stone River, Hawkins Creek, Macknade, Ingham, and Long Pocket. While visiting the district, inquiry will be made regarding the occurrence of primary cane pests at the different localities coming under observation.

During the flighting season of greyback cockchafers, and of other related scarabæid cane beetles, living and pinned specimens will be collected, the former for breeding at this Experiment Station, the latter for inclusion in our official collection of dried insects.

Certain data, also, in connection with grub and beetle borer damage, presence of moth borers, rat damage, &c., will be obtained for future reference and consideration.

ENTOMOLOGIST'S ADVICE TO CANEGROWERS.

Wireworm Damage in Evidence.

Cases of injury to young ratoon cane from attacks of wireworms have been brought under our notice during the last few weeks. Many of the stalks in such affected shoots are observed to wilt, turn brown, or dry up, and upon examination will often reveal the presence just below the surface of the ground of an irregular cavity which has been gnawed through the soft rind, and may in some cases extend to the centre of the shoot, thus bringing about death of the heart-leaves.

The larvæ of Click beetles, which are often termed wireworms, are long, more or less cylindrical in shape, and of narrow, even width, something like the shape of a small earthworm; the body being usually firm, glossy, and yellowish in colour.

When handled they slip easily from between the fingers. In most species the beetles are obscurely coloured, being uniformly dark-grey or blackish. When laid on their backs on a flat surface they are able to spring into the air and regain their footing, by means of violently jerking the body downwards on the hard surface.

Control measures are usually directed against the beetles. A bait made of chopped grass dipped in a solution of sodium arsenite and molasses (1 lb. arsenite, 8 lb. molasses, in 10 gallons water) has been found effective. The beetles should be collected from such baits soon after nightfall. Commonsense remedies are to increase the humus content of infested soils; while ploughing deeply collect the wireworms by hand before planting, and thoroughly drain and work the land when necessary, this control measure being of great importance on land which happens to be low-lying and badly drained naturally.

Cane Grub Control.

First-stage grubs of the "greyback" cockchafer will still be feeding at the beginning of this month, when they will change their skin and commence the second instar, during which, when numerous, they are able to cause serious damage to cane growing in light friable soils.

In order to distinguish between these moults of the grub stages of this cane beetle growers need only examine the head, which, unlike the body, does not alter in size after each succeeding moult. The width across the head in grubs of the first instar is ⅛ inch, in the second stage ¼ inch, and in the third stage ⅜ inch.

Keep the soil on areas liable to grub-infestation moving, at frequent intervals if possible, between the rows of young cane, during the month or five weeks occupied by the first larval instar, especially when the surface happens to be caked after heavy rain. Go as deep and as close to the plants as can be ventured without incurring risk of injury to main roots. Such treatment, in addition to promoting vigorous growth of the stools, tends also to destroy a certain percentage of the small first-stage grubs of this pest, and by opening the surface soil enables ants or other small enemies to reach them.

Growers are advised to maintain clean cultivation on land being reserved for early planting throughout the flighting season of the beetle, as a dense growth of weeds, &c., between cane rows often attracts egg-laden females of both the "greyback" and French's cane beetle, the latter being very fond of ovipositing in such places.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received from Mr. R. W. Mungomery, Assistant Entomologist at Bundaberg, the following notes (17*th December*, 1929) *having reference to cane grub infestation in the Bundaberg and neighbouring districts:—*

Notes on Grub Infestation.

It is rather significant that many of the farms in the Bundaberg district which have suffered from the ravages of grubs during the last spring have been those on which, or adjacent to which, it has been the custom to ratoon the cane over a long number of years. Old ratoon crops have in most cases suffered the severest damage. The losses incurred through the death of the stools from grub attack do not, in such cases, constitute the sole loss, since another factor enters into the question; that is, the fact that these old ratoons aid in perpetuating the grub pest, and are the means of spreading the infestation to younger blocks of cane nearby, which likewise suffer a considerable amount of damage.

Why Grubs Disappear.

In many instances it is true that some areas which formerly were notorious for grub damage are now almost free from this pest, or, at most, suffer no appreciable damage. This is most likely due to the combined action of insect parasites, predators, and diseases, both fungus and bacterial, all of which combine to keep the grub population down to very small limits. On the other hand, some areas previously free become infested, and once grubs become established in large numbers on a farm they usually remain troublesome over a period of years until the natural controlling agents increase sufficiently to reduce their numbers and restore the balance of nature. In areas such as these where growers know that their own or neighbouring farms have been infested within recent years, they should be forewarned and not allow their crops to ratoon too many times. After harvesting the second ratoon crop would, in most cases, be a good time to plough out and prepare the land for another crop. Although the writer is aware that in this district ratoon crops are, generally speaking, less costly to grow than plant crops, and also that growers often like to ratoon as long as they can profitably produce a crop, it is a case of false economy when by so doing they encourage grubs to increase unchecked.

The Rate at Which Grubs Increase.

In support of the above, the following example of the rate of increase of grubs will, no doubt, be of interest to those growers who have not yet become familiar with this side of the question. Take the case of a pair of large grubs which are below plough level, and therefore remain in the soil during the course of its preparation for spring planting. They change that year into the pupal and adult stages, and, assuming an equal sex ratio and reinfestation, thirty eggs are laid which, on hatching out, give rise to thirty grubs to infest the plant crop. Again, disregarding for the present deaths from natural enemies and infestation from outside, both of which factors, however, do operate, these grubs within a two-year life cycle remain over into the first ratoons, which they damage when young. In the following year they change into beetles, and the grubs resulting from these thirty beetles will then amount to 450, which will do a vast amount of damage to the young third ratoon crop, and would most likely completely destroy it. This demonstrates the fact that. by hand-picking and carefully cultivating the ground so as to rid it of grubs previous to planting, the infestation up to the second ratoon crop may be kept reasonably small; but by carrying on the practice of ratooning any further, this encourages a relatively heavier infestation of grubs in succeeding crops, which are in danger of being eaten out. This, therefore, gives every justification for recommending that, in grubby areas, the cane crop should, as far as is reasonably possible, be ploughed out after harvesting the second ratoon crop.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received from Mr. A. N. Burns, Assistant Entomologist at Mackay, the following report (17*th December*, 1929) *for the month ended* 12*th December*, 1929:—

Occurrence of Set Boring Grubs (*Pentodon Australis* Blkb.) in Racecourse Mill Area.

During the past month several fairly extensive outbreaks of grub damage to young plant cane were brought under the notice of the Experiment Station, and when inspections were subsequently made of the affected areas the injury was found to be caused by second and third-stage grubs of the *Pentodon* beetle. The chief damage was observed in farms quite near the mill, but also on several farms at Te Kowai, Walkerston, and Homebush, minor infestations were noted.

The injured cane presented a similar appearance to that damaged by grubs of the frenchi beetle, though the heart-leaves were more withered then they usually are when greyback or frenchi grubs are at the roots; this is no doubt due to the fact that grubs of this beetle invariably bore into the shoots below ground level or else into the sets themselves. Unlike the other two abovementioned species they are not very partial to the fibrous roots of the cane. In some instances as many as four and five third-stage grubs were found inside the sets, some had entered through the cut ends, whilst others had bored through the rind into the interiors of the sets. Holes made by these grubs were usually quite round, and their tunnels may be several inches in length.

On account of the prevalence of this insect at times in the Maroochy River district, near Brisbane, and its characteristic habit of boring into shoots and sets, it has received the appropriate name of the "Black Stem Gouger." The adult beetle is jet black, hence that descriptive part of the name.

The life cycle of this insect is comparatively short, and there are probably several generations of it produced in a year, though only one main one because most of the eggs are recorded as being laid during the spring months, thus producing the generation at present active in canefields. The three stages of the grub are passed through in the space of a few weeks, and the pupal stage occupies about three weeks only.

In nearly all the patches affected on the farms inspected, also on the Experiment Station where a few of these grubs were discovered, the infestation was confined to hollows in the fields, or else to areas where silt had been deposited by rain water, and therefore naturally low areas.

Outbreaks of this pest do not appear to be general every year; they seem to occur every few years with a comparative scarcity during the intervening years. The beetles themselves are not very frequently noticed on the wing, odd specimens are sometimes attracted to artificial lights. This beetle is recorded as being rare in the Cairns district, but occurs freely in the Mackay, Bundaberg, Maryborough, and Brisbane districts. Besides being recorded as a cane pest in Queensland, this species also attacks the roots of corn, both in New South Wales and some parts of Queensland. There are several other related species belonging to the same genus (Pentodon) which are recorded as being injurious to various root crops in other parts of the world.

A brief description of the fully-fed third-stage grub is as follows:—Length, in natural curved position, ⅞ to 1 in. (about 22 mm.), width of head 0.2 in. (5 mm.), body whitish-cream with abdominal segments dirty bluish-black. Dorsally the tops of the curves of each body segment and the inter segmental ridges carry several (from 2 to 4) tranverse rows of short dark-brown bristles. Spiracles brown, a pair on each of segments 1 and numbers 4 to 11. Legs pale yellowish brown, joints 2 and 3 carrying a number of long brown hairs. There is no distinct anal path; the anal segment carries on its ventral surface a patch of dark-brown bristles, about 110 in number. Those following the anal suture (numbering about 10 on either side) are much longer than the other bristles. Head dark-brown, mandibles very dark-brown at base becoming quite black towards and at the extremities. Labrum dark brown-black. Antennæ brown, devoid of hairs.

The pupa measures about ¾ in. in length; when newly changed it is creamy yellow in colour, darkening to brown as development progresses. Abdominal segments sharply defined, eight visible dorsally, and forming a slight ridge along the middle of the dorsal area. The junctions or sutures between these segments from numbers 1 to 5 have a small dark-brown inverted V-shaped marking (slightly flattened) at their medians. The tip of the anal segment carries a small cleft brownish marking.

The adult beetle measures about ¾ in. in length (16 mm.) and is of a uniform shiny black colour above. The ventral surface, particularly in the coxal sutures and near the outer edges and segmental junctures, is reddish-black. The portions of the legs extending beyond the body are black and thick set, also moderately hairy. The antennæ are dark reddish-black.

To date outbreaks of this insect have not really been extensive enough to warrant fumigation, but this method of control could be carried out if necessary and in precisely the same manner as for grubs of the greyback beetle. As the areas subjected to attack are usually small, replanting with sets (whilst wet) that have been dipped in a solution of sodium arsenite, molasses, and water has been recommended. Further injury is not likely to occur from the present time onwards, because now all the grubs are practically in the pupal stage; and the other generations produced at times other than the spring months do not appear to cause much injury. In the Bundaberg district it was noticed that where thin sets had been planted they suffered the most, doubtless owing to the lack of reserve nutriment for the shoots and roots. Where thicker sets had been planted the effect on the cane was not so bad, and new shoots developed from the bases of the original ones.

Neomaskellia bergii, Sign.

Occurrence of Sugar-cane Aleurodid or "Snow Fly" (*Aleurodes berghi ?* Sign.) at Farleigh.

Some two weeks ago numbers of this small insect were observed in a field of plant cane E.K. 28 and Q. 813, and about 2 miles from the Farleigh mill. A considerable number of plants were attacked, and the injury inflicted by these aphid-like insects combined with the extremely dry weather conditions had caused a considerable amount of yellowing of the plants.

These insects secrete a saccharine-like substance which is greatly attractive to some species of ants, which in consequence swarm over the Aleurodids to obtain this sweet substance. These ants no doubt form a natural protection to the former from parasitic insects, &c. The ants attending the specimens observed were a small black, long-legged, active species, probably belonging to the genus Cremastogaster, which contains a number of ants that are found in company with aphids, hoppers, larvæ, &c.

Very little appears to be known regarding the life history of this insect which appears to be identical with a species that commonly attacks sugar-cane leaves in Java.

The eggs are laid in groups on the under surface of the cane leaves, invariably the older leaves. The young larvæ on emergence "form oval glass-like cases of different colours and feed inside these and finally pupate there." (Froggatt, Ent., N.S.W.)

The adult insects are very active, and when disturbed spring out and fly from the cane. Whilst feeding they congregate in little groups on the undersides of the cane leaves and amongst the larval cases, eggs, &c. In this position the wings are kept folded tent-like over the back which gives the insects a triangular appearance. The total length in this position is about 1.75 mm. With the wings expanded they measure approximately 2.5 mm. The forewings are greyish white with two distinct and one obscure black transverse bands across them, the obscure one being situated between the other two. These bands are intercepted by a longitundinal vein which runs the entire length of the wing, almost centrally. The two distinct bands are situated one near the base of the wings and the other in the sub-apical area. At the end of the central wing vein on the outer edge is a small black spot; there is also another minute black spot almost at the base of the wing in the lower hind margin below the median vein and between the first two transverse black markings. The hindwings are much smaller than the forewings and are semi-transparent whitish. The head, thorax, and abdomen are dark-greyish with a bluish tinge, and the legs are brownish.

Attacks by this insect have so far never been recorded as having been severe enough to call for control measures. As it is, the outer and consequently older leaves of the cane shoots only are attacked, therefore a fairly easy and efficient control would be to simply cut these off, which would not injure the plants, and burn them. By this method no doubt many adults would escape, but all eggs, larvæ, and pupæ would be destroyed.

The following report (30th December, 1929) from Mr. W. A. McDougall, the Assistant to the Entomologist, Meringa, has been received by the Bureau of Sugar Experiment Stations:—

Attempts to establish tachinid flies in the Herbert River district have not been successful. Under 1 per cent. of sticks is infested by borer; much too small an infestation to support flies.

Of the minor pests, the "army worms" do very little damage, and "dead-hearts" are noticed occasionally. The false wireworm (*Gonocephalum carpentariæ* Blkb.) was reported as attacking cane during February and March of this year. The damage from this beetle, in these instances, would not necessitate control measures as given on page 34 of Bulletin 3, Revised Edition 1927 (Bureau of Sugar Experiment Stations).

As in other northern mill areas the grub damage, during the early part of this year, was the heaviest for many years. Most of it was confined to the Hawkins Creek (Macknade mill) and Upper Stone (Victoria mill) districts. The weather conditions during the past six weeks have given beetle emergences (from the ground) a severe check. About 6th December at Hawkins Creek and 27th November at Upper Stone would see the beginning of much lighter flights than those of last year. Elsewhere in these mill areas "greybacks" are comparatively scarce. There were numerous Christmas beetles (*Anoplognathus boisduvali* Bois.), called the "Golden Beetle" by the farmers on the Herbert, and *Repsimus æneus* Fab. ("Blue Beetle") resting on Moreton Bay Ash or Poplar Gum. Near Halifax single specimens of *Anoplognathus smaragdinus Ohaus* (female) and of *Calloodes rayneri* Macleay were shaken off a tea-tree and off River Hibiscus (*Hibiscus tiliaceus*), called "fourpenny" tree by the farmers. Of these four species of beetles the first is known to damage cane, but only under exceptionally dry weather conditions. One farm suffered from grub damage during September of this year. It appears that grubs of *A. boisduvali* were responsible. There are still some third-stage grubs of this beetle to be picked up alive, while it is evident that many have been destroyed by Campsomeris wasps. Pest destruction funds are, as usual, paying for beetles collected. Unfortunately, the two districts which suffered the damage from grubs during the early part of this year cannot pay for beetles at present. Most of the funds were spent combating other pests. Early next year those in charge of this type of work in the Herbert River district hope to put in trial fumigation plots against the "greyback" grubs. From the nature of the flights it would seem that extensive digging will have to be done and careful selections of localities made for these trials to serve their purpose.

Thanks are due to field officers of Macknade and Victoria mills, the secretary of the H.R.D.C.G.A., and several farmers for help given and information supplied.

THE JOURNAL APPRECIATED.

Renewing his subscription to the "Q.A.J." for another five years, a Cooroy farmer writes (2nd January, 1930):—

"We appreciate its help; receive profit from its instructions; enjoy its pictures; and admire its literary quality. We look for its coming every time."

ARMILLARIA ROOT ROT.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

Armillaria mellea, commonly known as the honey fungus on account of the characteristic colour of its mushroom-like fruiting stage, is one of the comparatively few fungi which are well able to adapt themselves to either a saprophytic or parasitic habit of growth. Normally this fungus lives as a saprophyte on old decaying roots, stumps, &c., but should it come in contact with the root of a suitable living host it can attack this, usually per medium of some injury, and cause extensive rot which very often ends in death.

As a parasite the fungus is capable of attacking many different hosts belonging to widely separated groups of plants. In Europe, considerable loss occurs in the pine forests as the result of the rotting of the roots and base of the trunk by this fungus. In America many native and introduced trees may be attacked. In Australia Armillaria root rot is found affecting, in many cases to a serious extent, citrus, deciduous trees, especially the apple, and the grape. The potato is also sometimes attacked, and is noteworthy as being one of the few herbaceous plants affected with the disease.

SYMPTOMS.

Unfortunately this rot is a somewhat insidious disease, and considerable damage may be done to the underground parts of the plant before the symptoms resulting from this are sufficiently marked to be noted. An affected tree usually exhibits a stunted condition of growth, a yellowing of the foliage, and possibly more or less dieback. Branches on one side having for their source of supply one or more attacked roots may exhibit these symptoms to a more marked extent. Frequently the tree when approaching a dying condition will throw an abnormally large crop of fruit as a last effort to perpetuate its species.

Should any such symptoms be observed, the soil should be removed well away from all the main roots and a careful examination made for signs of Armillaria invasion. This will be indicated by more or less extensive areas of soft rotting bark, which may be easily stripped off, and yields a characteristic mushroom odour. White felt-like wefts of closely interwoven fungal threads may sometimes be observed lying between the bark and the wood.

The most characteristic feature is the presence of shiny-black or dark-brown string-like fungal strands or rhizomorphs. These rhizomorphs are specially modified structures developed to enable the fungus to resist the adverse conditions of desiccation, &c., met with during its life in the soil. Each strand consists of an outer resistant layer or cortex formed of closely interwoven fungal threads or mycelium, which are intimately fused with one another to give a cellular structure resembling that found in the higher plants. The central portion consists of more loosely woven mycelium, and is known as the medulla.

In citrus the black rhizomorphs lie more or less embedded in the softened bark or else radiate out as free, branched strands. In the former case they may appear merely as short black irregular streaks protruding from a crack in the bark, or they may be entirely superficial though firmly attached (Plate 38).

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* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

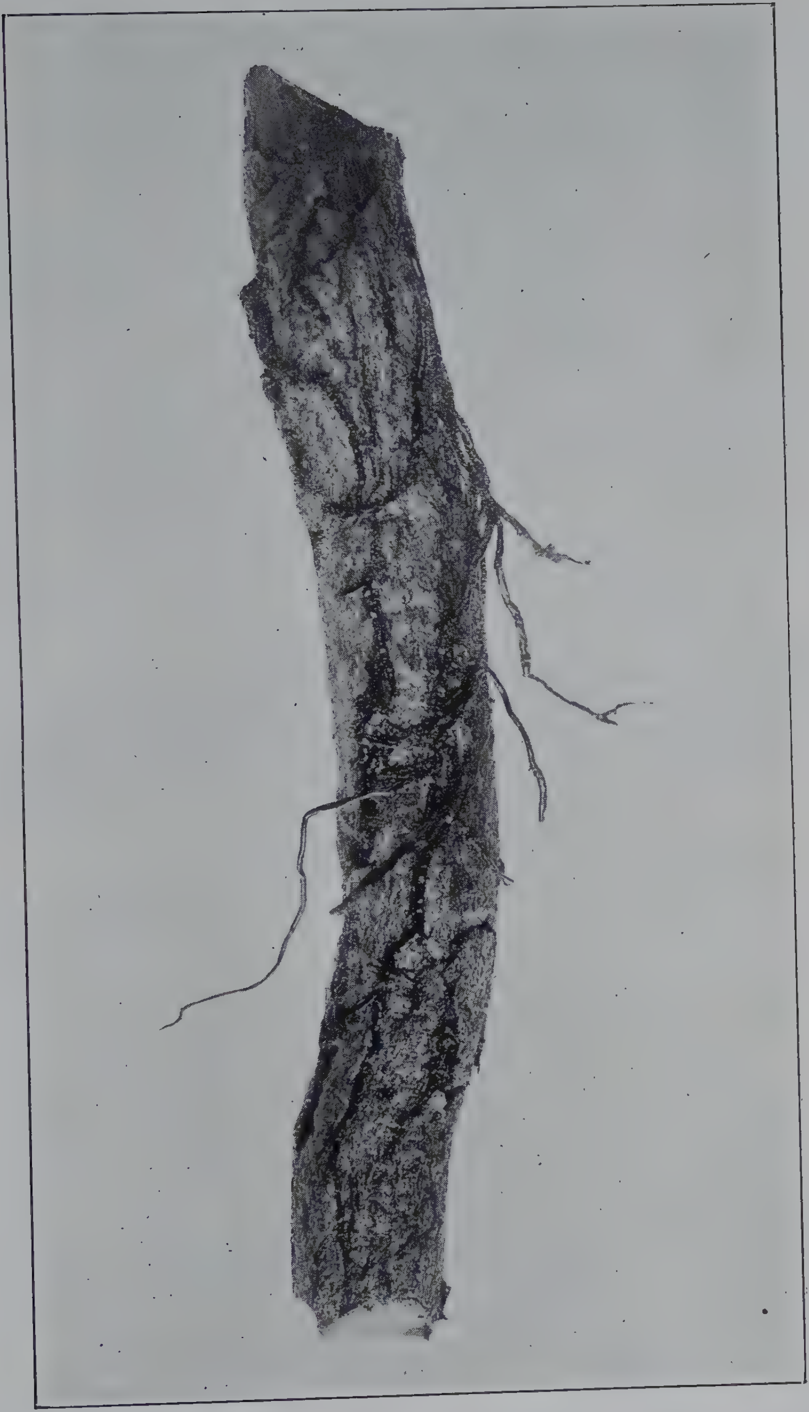

Plate 38.—Orange Root attacked by *Armillaria mellea.*

In the apple and most other fruit trees the rhizomorphs are free and appear as black strings more or less tangled round the roots. These are attached at various points, and from these the fungus extends out into the bark and woody tissue of the plant.

The rhizomorphs are capable of growth from their free ends for considerable distances through the soil, and it is largely by this means that the spread of Armillaria takes place.

Armillaria mellea belongs to one of the highest groups of fungi, the Agaricaceæ, which includes those of the mushroom type. During a period of wet weather in the autumn the fruiting bodies of this fungus may appear in clusters round the base of old rotting stumps, &c., or beneath fruit-trees badly affected with the disease. These structures are of the ordinary toadstool shape, and have a yellow-brown or honey-coloured stalk and disc, the latter being speckled over with small brown scales. The gills on the under surface of the disc are white and distinct. Covering the outside of each gill is the layer known as the hymenium. This consists of closely packed club-shaped cells, some of which project somewhat further than their neighbours and develop on their apex four short peg-like projections, on each of which is developed a minute rounded basidiospore. Many millions of these spores may be produced in a day by one toadstool.

The basidiospores germinate and are able to infect decaying wood with which they may be associated and thus serve to extend the saprophytic activities of the fungus. Apparently the living plant becomes infected only when attacked by one of the rhizomorphs. In a new orchard these have been previously developed upon rotting remains of scrub and forest trees left in the ground during clearing operations. Usually the fungus gains entrance through an injured or dying root or through one which is closely associated with the original rotting material.

CONTROL.

If possible, land which is to be used for orchard purposes should be well stumped and have all the main roots removed by thorough and deep ploughing. Annual crops, other than potatoes which are also affected, could be planted for a year or more in order to allow time for the fungus to die out of the soil.

If a preliminary inspection has shown a tree to be attacked, the soil must be removed well away from the crown and main roots so as to expose them to easy access. Any badly rotted roots are then removed entirely. Others less extensively attacked must have the affected areas thoroughly cut out until sound tissue is reached, after which Bordeaux paste should be painted on the wounds. Any diseased material will of course be carefully collected and burnt. The pieces may be conveniently gathered by laying a piece of paper under the scene of operations. The main roots should be left exposed to the beneficial action of the sun and air for as long as the absence of frosts will permit. This treatment is usually effective only if the disease is caught in its early stages before the fungus has pentrated too deeply into the wood.

If a tree is too badly diseased for remedial measures to be a success, it should be carefully removed together with all its roots, and should be burnt on the spot. If the original stump or root from which infection started can be located, this also should be dug out and burnt.

The affected area is then best isolated, to prevent the spreading of the fungal rhizomorphs through the soil to healthy trees, by digging a trench 2 feet deep round the outside of the furthest root extension of the diseased one. The soil within the trench should be repeatedly turned over and exposed to the sun. Replanting should be delayed for two or three years, otherwise there is a chance for the new tree to become infected from rhizomorphs unintentionally left in the ground.

RURAL LIFE IN OTHER LANDS—IX.

By the EDITOR.*

HIGHWAYS IN HOLLAND.

SO unique are its problems, so industrious are its people, and so interesting is the country generally that one was tempted to stay a little longer in Holland after leaving Germany and before going back across the border into Belgium and down once more along the pleasant roads of France where the sun is sometimes seen for at least two successive days.

Nature only gave the Dutchman a sporting chance to settle and develop his country, and how slender that chance was can be imagined when it is known that, but for the long lines of dykes that dam back the sea, any high tide would swamp nearly 40 per cent. of the total land surface of the country. Miles and miles of embankments are also necessary to hold in channel the river waters which, uncontrolled, would flood vast tracts of what is now, more or less, dry land.

The eternal battle of the Dutch farmer is to keep his head literally above the water—we would welcome some of his complaint in parts of Queensland—and the story of his age-long fight against that element is one of the most inspiring in human history. That he has succeeded against such heavy odds is a tribute to characteristics of invincible pluck, dour determination, and an unbeatable spirit that arouses at once one's admiration.

A Nation Built Out of a Bog.

"He who cannot keep out the water doesn't deserve the land" is the principle on which the man of Holland built his nation up out of the bog. The immensity of the problem is evident when it is realised that most of the country is below sea level, so ordinary drainage was out of the question. To meet this difficulty (a very serious one in a wet climate) a system of uphill drainage was devised. This is how it was done: When it was decided to reclaim a water-covered area a dyke was built round it. Windmills of sufficient power and dependability were erected and a series of canals constructed. By wind power the water in the drains on the lowest levels was lifted into higher ditches, until finally it was delivered into a high-level canal with an outlet to the sea.

I saw a device on something like the same principle, but of different mechanism, at a place called La Louviere, near Mons in Belgium, where it is necessary to lift fully-laden barges from a low-level canal to a high-level channel. The lift was something like 30 feet. Though it seemed an impossibility to a layman at first glance, yet it was quite simple in practice. It was done in this way: The barge was floated into a lock or tank with doors or gates that could be sealed and made water-tight at both ends. As soon as the gate entrance to the lock was closed the mechanism was brought into action. This was governed by hydraulic power and the lock or tank, with its loaded barge afloat on the impounded water, commenced to rise slowly on great steel shafts on a principle similar to that employed in the operation of old-fashioned hydraulic lifts in lofty buildings. On reaching the limit of elevation the other gate of the lock was released and the laden barge floated out into the canal on the higher level to sail majestically on its way. All through the Low Countries, in Holland particularly where most of the country's transport is by water, one often experienced the illusion of barges sailing placidly through green-grassed fields without being water-borne. This illusion was heightened when the canals were high above the bordering land levels.

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* In a Radio Talk from 4QG.

What the water question means to the Dutch people, particularly the Dutch farmer, is expressed in the fact that one of the most important of public offices is the Waterstaat which supervises generally the means of countering the constant problem of how to get rid of unwanted water.

A Land of Ordered Beauty.

Every highway in Holland—they were cobbled with stone cubes like the old familiar road to Armentieres—seemed to be bordered on either side with a canal and a row of trees. Through towns and villages the canals flowed and into them was dumped all household refuse—in fact, the canal seemed to take the place of the compost heap in every French and Belgian back yard, and neither Kingfisher Creek nor Upper Breafast Creek could compare with them in strength and power of smell. But in spite of it all, on figures, Holland is one of the healthiest countries in the world, though at least one cynic has remarked that the slow-moving, almost stagnant water in the canals of Holland is so bad that even microbes haven't a chance to win a living in it. That is, however, by the way.

Perhaps, because it seemed so different from any other environment that one had known, that one learnt to appreciate the ordered beauty of rural Holland. Well cared-for trees lined every roadway and bordered every canal. Through the trees one saw fields as flat and fresh as bowling greens. No fences or hedges broke the vista, trenches formed the dividing lines between the farms. Canals and ditches criss-crossed the landscape.

Where Everybody Works.

Everyone seems to work in Holland—I am speaking now of the country—not of its cities, where poverty, the bitter struggle for existence and heart-breaking unemployment are much what they are like in the centres of population of other European countries—and everything seems to have a definite utilitarian value. The farmhouses seem to have been built on a uniform plan—square, solid brick structures with high pitched roofs—the space under the roof being generally used as a hay loft. Cattle are housed in winter in an extension of the dwelling and practically under the same roof. The winter quarters of the stock are kept scrupulously clean. The cattle are housed from November until April, and for the rest of the year are milked in the open. It is a common sight to see the cows milked alongside the road without bails; leg-ropes are used, but in a different way from our practice. The animal's legs are tied together below the knee and thus the risk of Daisy kicking the bucket, or putting her foot in it, is obviated. The Friesian—great framed, big-boned, well-fed animals—is the favoured breed. In Holland one never sees a poor cow. Most of the milk is used for cheese, which is processed in co-operative factories. The cheese is moulded, as a rule, into balls about as big as a boy's soccer football, then salted for a couple of days and then stored for curing. After a fortnight in storage they are marketed.

Living on the Cow.

Dutch farmers sell on outside markets something over 80,000 tons of cheese a year, valued at over £6,000,000 sterling. Butter exports are about the same. Condensed and powdered milk are also exported, their annual value approaching £5,000,000 sterling. Altogether in Holland, with its population of about 8,000,000 and its area of 12,500 square miles—about equal in size to a North Australian cattle station—nearly 600,000 people depend on the cow directly for a living. The dairy business is carried out co-operatively, almost entirely so, and the highest efficiency is aimed at in every stage of production, processing, and marketing. Every cheese, for instance, must bear the brand of the Netherland Cheese Control as a guarantee of quality. Every package of butter carries a similar guarantee.

Where Flower Gardens are an Economic Asset.

A short run by car from the dairying country brought us to a district where rural industry was entirely different. The land there was originally a lake bottom which had been entirely drained and reclaimed. Flower cultivation was evidently the main industry, and the whole way ran through beautiful flower gardens in which the tulip predominated. When these gardens are in bloom the delightful artistry of Nature reveals itself in a riot of gorgeous hues. The effect of this massed colouring is marvellous. In comparison one thought of emerald slopes in Picardy, poppy splashed—seemingly careless spills of intensest red on fields of green enamel; of apple lands in Normandy in early autumn; of an English woodland in summer with its beautiful bluebell carpet; of the Vale of Glendalough in Ireland, where the greenest of green is seen; of Scottish highlands clad in royal purple when the bloom is on the heather; of streets in Perth when the flowering gums are blossoming; of cannas grouped in Sydney gardens; of Brisbane in jacaranda time, or later, when the poinciana offers for our admiration its glory of scarlet beauty. A large export trade in bulbs and seeds has been built up with Britain, America, and other countries. The flower lands have been cut up into very small holdings, and that is one of the reasons why farmed area averages are so low in Holland. About three-fourths of all the farms in the country are of areas less than 25 acres. About 15 per cent. are from 25 to 50 acres, and only 2 per cent. more than 125 acres in extent. Only twenty-four people in Holland own more than 500 acres, and only 216 holdings are more than 250 acres.

Every district seems to have its own distinctive rural industry. For instance, round about a place called Boskoop something like 10,000 people make a living out of cultivating nursery stock, mainly for export. From Boskoop it is only a coo-ee over to Gouda, where cheese is the standby; and not far across to North Brabant and the southern province of Limberg where cheese, though of a different order (and smell), is also made.

From the flat country Limberg is a break with its picturesque, low, road-ribboned hills and quadrangles of growing grain and blossoming orchard lands.

Reclamation of the sea bottom and other water-covered lands is still proceeding in Holland. The Zuyder Zee is the scene of the biggest operation, and it is planned to add, when this project is completed, 500,000 more acres of fertile soil to the Netherlands land area, which will make more room (not much) for Holland's ever-increasing population.

One of the World's Best Object Lessons.

There was always, in one's brief wanderings through parts of rural Europe, something to learn, estimate, or compare—the characteristics of the people, their customs, methods, traditions, outlook, and so forth. And there was always much to wonder at, to appreciate, and to highly appraise. There was to be experienced, too, the charm of scenic variety and historical associations in many lands where the records of our human story are etched on every contour, and in which many architectural monuments mark as milestones the march of human progress down the centuries.

One of the most interesting countries of Europe is Holland, or, as the Dutch like to call it, the Kingdom of the Netherlands, and it furnishes one of the best object-lessons in the world in the way of conversion of waste lands into fertile and prolific farming country. Holland, as we in Australia measure areas and distances, is a very small country with its total land surface of 12,500 square miles. The country is divided naturally into low-lying delta lands, which have been reclaimed from the sea—a region of natural channels and canals—and a definite section of that great North European plain which takes in Belgium and Northern Germany. The climate is rather colder than England, and, as cultivation of the soil is so intense, there is very little natural vegetation. Holland's main home production includes bulbs, sugar-beet, flax, other ordinary farm and garden crops, and dairy produce. It is net-worked with an excellent road system, and water carriage by canals adds to the ease of transportation. It does a large transit trade with the Rhine Valley, and also a big export business with Britain and its nearer neighbours.

Something Like an Agricultural Problem.

Nearly 35 per cent. of Holland's total area is alluvial, and that accounts for its great fertility. Originally much of the land along the North Sea coast, which is below sea-level, was peat moor constantly flooded. Lakes were formed, and these were drained or pumped dry by windmill power. The lake bottoms and other water-logged lands were converted by infinite labour against river and sea encroachment into very rich pasture lands. That was something like an agricultural problem.

This great national work, of course, could not be done by individuals, and a system of co-operation was instituted throughout large districts. This co-operative system of water fighting was not backed by any State organisation. Its beginning was the effort of private initiative a thousand years ago.

This spirit of co-operation, which is one of the outstanding characteristics of the Dutch farmer, in rural enterprise was, through continual battling against the elements, with the possibility of overwhelming disaster always round the corner, grafted into the very soul of the nation.

Modern engineering skill has, of course, removed what was an ever-present dread; it has been a great factor in the success of other and more extensive reclamation schemes in Holland, but the cost of maintenance of dykes and waterways still goes on. From 10s. to £1 an acre is the annual charge imposed for the upkeep of the service. The reclaimed lands are of great natural fertility, and not only is a high acreage production the rule, but crops are regular and reliable. As Britain may be regarded as the stud stock farm of Europe (and the world generally for that matter), so Holland may be called the vegetable garden of Western Europe.

The low level of the country and natural fertility of the soil, so much of which was won from the sea, is very favourable to dairying as practised in Holland. About 27 per cent. of the country is cultivated, and about 38 per cent. is under permanent pasture, but these figures do not give quite a clear idea of the importance of grass lands in Holland. Most of the best soil is carrying grass, and grazing of dairy cattle there may be described almost as an exact science. Not a square yard of pasture is allowed to remain idle, and pasture restoration and renovation are carefully and continually practised. In some districts not a single acre of ploughed land is to be seen, only 5 to 10-acre fields, as flat as a tennis lawn, in which a furrow is never turned, and on which one seldom sees a horse, but instead herds of sleek dairy cows cud-chewing or grazing contentedly, and occasionally some sheep and pigs.

Dutch Dairying.

In Holland, according to the information available, in the course of the last fifty years or so, cattle breeding, cultivation, and dairying have been so improved technically that, notwithstanding an ever increasing population and consumption, the export surplus of dairy products has kept going up. Although the population has increased since 1900 from 5,000,000 to somewhere about 8,000,000, the export of butter has gone up from 22,000 to 45,000 tons; of cheese from 47,000 tons to 84,000 tons, and of condensed milk from nothing to 148,000 tons. The fact that Holland, with all its disadvantages and physical difficulties, is probably the greatest exporter of cheese, proves how much the production of food can be increased by sound farming assisted by trained scientists and technical experts.

Another remarkable thing is that this high production is possible in a country where most of the farms are comparatively small. Large landed estates are unknown in Holland. In the pastoral districts the size of the farms varies between 40 and 100 acres, cattle are kept in the open from mid-spring until late autumn, and housing of stock is thus necessary for about five months of the year.

That agricultural production in Holland has been lifted to such a high level is due not only to the practical skill of the Dutch farmer, but also, as in Denmark, to the excellent organisation of agricultural instruction by the State. The way is made easy there for every farmer's son to receive sound technical farm training, and for the farmers to obtain sound advice at very little cost. In this regard our own system in Queensland bears favourable comparison, with this difference—that the services of trained agriculturists and scientists are made available to the Queensland farmer without any charge whatever.

Rural Education.

Of course, in Holland with its long winters, when farmers naturally spend much of their time indoors, rural education is sought, perhaps, with greater earnestness, but so strong is public opinion there on this subject that a young farmer who has not attended an agricultural winter school, or, at least, taken a winter course in agriculture or animal husbandry, is not taken seriously. The consequence is that the younger generation of farmers no longer holds on to old-fashioned ideas and working methods, but eagerly applies in practice every available modern improvement. In Queensland we are doing something in this way through an excellent system, which is developing well, of winter schools of instruction for farmers at the Queensland Agricultural High School and College at Gatton.

No Fancy Farms in Holland.

Another fact worthy of consideration is that, in a country of small farmers, not overburdened with capital, breeds of dairy cattle should be worked up to such a high standard. In other countries this work is left to a few expert breeders. There are no fancy farms in Holland. Dutch breeders have always been influenced by economic conditions, and a Dutch farmer, we are told, cannot indulge in the luxury of breeding fancy cattle. Experience has taught him that raising milk production abnormally would, in the long run, give a smaller financial result if, at the same time, attention were not given to the cow's constitution. Nor does the Dutch farmer set any great value on artificially boosted high milk production of individual animals, especially when the fat percentage is not taken into account.

The Importance of Herd Testing.

He attaches great importance to milk-testing; more than 65 per cent. of the milch cows in Friesland, for instance, are regularly tested. Not only the milk production, but the fat percentage is regularly determined, and in selecting breeding cattle, greater importance is attached to the latter than to the former. By applying this method the average production of milch cows inscribed in the Friesian Herd Book has been raised from 4.357 kilos (kilog equals 2⅕ lb.) in 1912 to 4.586 kilos in 1924, and the fat percentage from 3.20 to 3.52 per cent., and the production of butter from 150 to 175 kilos within the same period.

In Queensland, of course, we have our own herd-testing scheme, the advantages of which are appreciated by an ever-growing number of dairy farmers. In other directions, too, we are well in the van of agricultural progress, but there are still left some avenues of rural enterprise in which, if I may so suggest, the Dutch farmer may be regarded by us all as a sound and industrious exemplar.

NOTES ON PROCEEDINGS OF THE AGRICULTURAL SECTION OF THE CONFERENCE OF EMPIRE METEOROLOGISTS, 1929.

Subjoined is a report of the proceedings of the recent Conference of Empire Meteorologists prepared by Mr. A. S. Fitzpatrick, M.Sc., who is attached to the staff of the representative in Great Britain of the Council and of the Development and Migration Commission, and which we have received from the Council of Scientific and Industrial Research:—

I attended the meetings of the above section of the conference held from 29th August to 4th September, 1929. During this time most of the overseas delegates attended, and there was a fair representation of agricultural research workers from Great Britain.

As will be seen from the attached papers, the subjects dealt with mainly concerned the ralationship between meteorology and various phases of agricultural research—viz., plant physiology and disease; fruit production; animal numbers; entomology; and crop forecasting.

Although papers dealing with one or more of these subjects were presented from most parts of the Empire, there was no printed contribution from Australia. Colonel Gold, however, read a paper which had been submitted by Mr. Hunt, the Commonwealth Meteorologist, dealing with the subject of seasonal forecasting. Despite the existence of valuable work—such as Richardson's studies on plant respiration—delegates to the conference might reasonably have deduced that there is little valuable co-operation in Australia between agricultural research workers and meteorologists.

The sectional discussions opened with a paper by Sir Napier Shaw on the value of weekly records of meteorological factors. Following discussion on this point, it was agreed by the conference that the monthly summary attended to obscure phenomena to a greater extent than would weekly averages, and that the week should, therefore, be adopted as a unit for observations in agricultural meteorology.

On the broader question of education in meteorology and its agricultural relationships, the conference felt that greater attention should be devoted by Universities, Agricultural Colleges, and Farm Schools throughout the Empire to provision of instruction in the physics of the atmosphere and the geography of weather.

It was obvious throughout the meetings of the section that the meteorologists were not fully aware of the exact data required by the research worker, and that the research worker, when he knew the exact data he required, was not aware of the apparatus or methods suitable for arriving at this data. This gave rise to one motion that meteorology could render valuable service to agriculture by assisting agriculturalists to devise standard methods for adoption in the systematic recording of these local climates and by studying the results as meteorological data.

The section also considered that there was scope to extend standard records in order to measure factors such as the intensity and quality of radiation and the moisture content of soil. When, however, the results of agricultural research are published, the section considers that those results should be accompanied by adequate meteorological observations since the results may be susceptible to closer analysis in the light of the meteorological conditions experienced during the course of the research work.

The question of establishing a clearing station for information on methods and results of agricultural meteorological work was considered. The Ministry of Agriculture and Fisheries is at present doing work in this direction, and certain aspects of agricultural meteorology are covered by the existing Imperial Bureaux of soil, science, animal nutrition, animal health, animal genetics, entomology, and mycology. It was, therefore, felt desirable to ask the Ministry of Agriculture and Fisheries to develop its work in this direction with a view to obtaining information likely to be useful as a guide to the Imperial Agricultural Research Conference which is to be held in Australia in 1932. The papers definitely setting out to establish a relationship between meteorological factors and specific problems in agricultural research in most cases showed that though their authors felt that meteorological factors were important and in some cases predominant in their influences, the exact degree of influence exerted by those factors had not been determined. For this reason motions were proposed and carried recommending surveys in different parts of the Empire to determine, for example, for fruit crops the effect of varying weather conditions on the growth, croping, and resistance to diseases and pests of fruit grown on soils of various types, and the degree of susceptibility to frost damage of the chief commercial varieties of fruit, and to discover the characters which confer resistance to frost.

In regard to the numbers of wild animals, it was felt that the fluctuations in these numbers was closely related to meteorological conditions, and that co-operative research should, therefore, be prosecuted.

Again, in relation to insect pests and plant diseases and their mass outbreaks, it was considered that more attention should be paid to the effects of atmospheric phenomena.

The question of forecasting crop yields provoked considerable discussion, and it was obvious that there was a wide divergence as to the best methods of estimating yields.

The section finally agreed that complete investigation was necessary to determine reliable methods for the improvement of forecasts. The statistical methods of Dr. R. A. Fisher, of Rothamsted, in ascertaining the effect of rainfall on wheat yield were mentioned in this connection, and it seems likely that Dr. Fisher's methods will be thoroughly examined during the next two years.

One's general impression was that the sectional discussions had provided a useful opportunity for the agricultural research workers to place before meteorologists of the Empire some of their difficulties, and the need for a closer connection between the study of weather and climate and the examination of biological problems. In particular, useful discussions took place on the best methods of recording soil temperatures, and of determining the photo-electric and photo-chemical intensity of daylight.

THE MOTOR A MODERN BLESSING.

''To state quite bluntly that the whole face of the civilised globe has altered and is being altered by motor-cars, to an extent which changes the attitude of the public towards morals, comfort, health, and even facial characteristics, savours of exaggeration at first sight,'' writes Professor A. M. Low, in the ''Sunday Dispatch.'' ''For a fortunate few the motor-car still possesses its sporting attraction, but to the majority it has become a necessity; far more important than the doctor's brougham and capable of bringing a new atmosphere into every phase of domestic or commercial life. The motor-car spells freedom. It is the most revolutionary agent that civilisation has known. It is helping to produce international peace and international language. It is changing the face of the world before our very eyes. An invention which brings with it a desire for education cannot but benefit mankind. Make no mistake. The changes that are taking place in civilisation are not all for the bad. For many of them the motor-car is entirely responsible.''

CHICKEN-POX IN POULTRY.

From February to May is the period over which trouble from chicken-pox may be expected by poultry farmers in this State, but by the adoption of the proper measures much can be done to minimise loss.

Chicken-pox, or "warts," is generally ascribed to bites of mosquitoes, which are believed by some to be the sole cause of the malady, but this is incorrect, observes the Poultry Expert of the Department of Agriculture. The so-called "warts" are proved, by both practical experience and scientific investigation, to be "chicken-pox," a specific disease, just as are small-pox and chicken-pox in human beings. Experience has shown that it is preventable in poultry—mosquitoes notwithstanding—at any rate so far as any ill effects are concerned.

It is admitted that mosquitoes play their part in its dissemination once it prevails among an unprotected flock, but the only question that is still in some doubt is whether the mosquitoes actually carry the infection, or whether the punctures made by the mosquitoes allow an opening for the infection to reach the blood, and more readily induce the infection. Observations suggests that the mosquito is not necessary to an outbreak of the disease, inasmuch as outbreaks occur where mosquitoes are not present. In these cases the first signs of the disease are yellowish-looking blebs, varying in size from a pin's head to a split pea about the combs and wattles of the birds. It is certain also that a place can be swarming with mosquitoes without any appearance of the disease, even in the season for it. Therefore, the mosquito, as a cause, must be acquitted. That it is a blood disease is definitely known.

Treatment.

Upon the first signs of the outbreak of this disease, the administration of Epsom salts and sulphur, as recommended below, should be at once begun, but in rather larger doses, or more frequently for about three weeks. The disease will run its course once it has broken out; but its severity may be modified in the case of the birds that take it later.

As soon as the sores appear, the main thing is to dry them up. For this purpose there is nothing better than painting the sores with tincture of iodine. Common laundry blue is also useful for drying them up. The iodine should, however, not be used on sores on the eye; this is where the blue is most useful. The painting will allay the itching irritation which causes the fowl to scratch the sores, and thus spread them all over the face, head, and comb. The sores spreading around the eyes and beak are responsible for most of the losses, owing to their preventing the birds from feeding; starvation, not the disease itself, causes most of the deaths.

The loss occasioned by an outbreak of chicken-pox is not only the actual loss by death, however, but the ruin of all prospects of winter eggs from the pullets attacked, because, after having had this disease, they usually break up and go into a half moult.

Measures for Prevention.

The measures that may be adopted to this end are very simple, but they must be commenced at the right time, and they must be faithfully carried out. To be effective, a commencement should be made about the first week in January, and 1 oz. of flowers of sulphur for the equivalent of every fifty adult birds should be given in the morning mash every third day for a period of three weeks. This should then be stopped, and for the next three weeks Epsom salts should be added every third day to the drinking water at the rate of 1 oz. to the gallon. At the end of the three weeks stop the Epsom salts and return to the flowers of sulphur in the mash, and continue alternating these treatments until the period over which chicken-pox is seasonable is past.

It is emphasised that the full protective benefit of the flowers of sulphur will not be obtained unless the advice given is carried out in its entirety and to the letter, but in order that no misunderstanding may arise it may be stated in terms of weight for weight. To every 7 or 8 lb. of the mash, whether wet or dry, 1 oz. of sulphur should be mixed, commencing well ahead of the time when the disease is liable to appear, and continuing till the season is over, which means that it is advisable to commence the sulphur treatment now, and to continue it through the summer till about April, or even May.—A. and P. Notes, N.S.W. Dept. Agric.

THE DAIRY HEIFER.

The dairy heifer is a unit of the potential milking herd. The breeder who knows how to grow and handle dairy heifers will add substantially to his achievement with his dairy herd.

The demand for reproduction and milk production are so heavy on high-producing dairy females that every opportunity must be given for growth and development before the animal begins her lactation period.

Improper feeding and breeding at too early an age are two factors to avoid.

The time to take advantage of the growth impulse is when it is most potent and when demands for milk production do not interfere with its influence.

Do not allow the dairy heifer to get a setback by turning on to scant pasturage or by improper feeding.—C. F. McGRATH, Supervisor of Dairying.

CHOOSING A DAIRY BREED.

The question of what breed of dairy cattle is the best had been asked by a number of persons either about to enter or engaged in the dairy business.

It is not so much the question of breed that requires consideration as the question of profitable producers.

There are good dairy animals that are profitable at the pail in all dairy breeds, and it is true also that poor producers are found in each breed. The selection of animals within the breed chosen is the matter of most importance. The breed chosen should be the one that appeals to personal taste and that is suitable to the conditions under which they are to be dairied. Any one of the dairy breeds is worthy of a place on our dairy farms.

The sure way to determine the dairy animal's value is to test it for production. The progeny of animals whose production has been recorded should be secured when possible. The milk-producing trait is hereditary, and selected females should be bred to sires with production on paternal and maternal sides.—C. F. McGRATH, Supervisor of Dairying.

DAIRY HERD IMPROVEMENT.

By C. F. McGRATH, Supervisor of Dairying.

An important factor of success in dairy farming is the use of improved dairy sires. Good dairy cows are far too scarce, and it would be impossible for dairy farmers to purchase a sufficient number of them to replace all unprofitable cows at present in our dairy herds. The way to fill the places of the unprofitable cows is by selection of females and the use of improved dairy sires. To continue dairying unprofitable cows and rearing females from them increases the number of "scrub" dairy cows, and is inimical to the progress of the industry.

The dairy farmer who continues to breed heifers from unprofitable cows will not secure a return commensurate with the capital invested and labour employed. Every breed of improved live stock has been developed by well-defined laws of breeding and selection. Under the influence of skilful selection, breeding, and feeding, the dairy cow has made marked and rapid changes, both in type and functions, and differs greatly in general characteristics, from the foundation stock from which the modern type of dairy cow has been evolved. The evolution of a special purpose dairy cow as we know her to-day is a tribute to the work of the breeders of dairy cattle.

The use of a pure bred dairy sire is essential, as purity of blood denotes that the animal possesses the characteristics of his breed for generations back. Pedigree alone, however, does not guarantee that a sire will beget heavy producing females.

Selection of a Dairy Sire.

The chief consideration in selecting a sire to head a dairy herd is the production records of the dams on both the maternal and sire sides.

The dairy sire either increases or decreases the production of his progeny. A prepotent dairy bull bred on production lines will beget offspring that are an improvement over their dams from the standpoint of production.

The solution of the problem of providing the necessary number of profitable dairy females to replace the unprofitable cows on our dairy farms depends upon systematic testing, culling, and the use of improved dairy sires.

The production recording of the cows comprising our stud herds is receiving increasing attention, and the records of thirty-three pure bred cows that in September and October, 1929, completed a 273 days' test and qualified for entry into the respective herd books, which are listed as follows, are well worth perusal:—

COWS THAT COMPLETED 273 DAYS TEST AND QUALIFIED FOR ENTRY INTO THE HERD BOOK FOR THE MONTHS OF SEPTEMBER OCTOBER, 1929.

Owner.	Address.	Name of Cow.	Age at Commencement of Test.	Milk Yield.	Butter Fat Yield. Lb.
		ILLAWARRA MILKING SHORTHORN.			
S. R. Alcock	Wooroolin	Favourite of Pine Park	Aged	9,345·25	388·037
J. Bradley	Goomeri	Wunulla Queenie 4th	Senior (2-year old)	6,701·148	286·724
J. Bradley	Goomeri	Wunulla Graceful 2nd	Junior (3-year old)	8,994·746	376·308
H. Dickfos	Coleyville	Molly 2nd of the Cedars	Senior (4-year old)	10,288·0	386·54
G. Heading	Murgon	Red Rose of Headlands	*Junior (2-year old)	11,407·298	430·72
G. Heading	Murgon	Miss Amy of Headlands	Senior (3-year old)	8,545·973	346·617
S. J. Lester	Laidley	Tottie 9th of Brooklyn Terrace	Junior (2-year old)	6,834·59	269·823
G. Lindenmayer	Binjour	Florrie of Wandegong	Senior (2-year old)	7,554·25	305·728
S. Mitchell	Warwick	Fuschia 3rd of Rosenthal	Aged	10,571·5	415·291
S. Mitchell	Warwick	Lilac of Goomburra	Aged	10,581·5	437·598
J. Phillips	Wondai	Midge 6th of Greyleigh	Aged	11,057·0	452·906
Queensland A.H.S. and College	Gatton	Rascal 12th of Thornleigh	Junior (2-year old)	6,048·125	247·839
Queensland A.H.S. and College	Gatton	Pet 6th of Thornleigh	Junior (2-year old)	6,786·825	272·567
Queensland A.H.S. and College	Gatton	College Violet	Junior (2-year old)	5,617·525	231·285
Queensland A.H.S. and College	Gatton	Queenie 5th of Fairholme	Senior (2-year old)	8,231·875	331·012
F. W. Woolley	Moregatta	Lovely 2nd of Beechwood	Senior (2-year old)	6,471·3	275·734
F. W. Woolley	Moregatta	Marigold 2nd of Beechwood	Senior (2-year old)	7,003·8	265·454
		JERSEY.			
R. A. Anderson	Yandina	Yimmin Shooting Star	Junior (2-year old)	4,295·9	241·966
R. A. Anderson	Yandina	Yimmin Society Girl	Junior (2-year old)	3,958·15	214·151
A. F. Birt	Gundiah	Buttercup of Glenore	Junior (3-year old)	5,537·25	307·653
J. Collins	Tingoora	Lady of Calton	Aged	10,389·25	597·151
J. Collins	Tingoora	Maisie of Calton	Senior (3-year old)	7,412·125	378·49
J. Collins	Tingoora	Lady Dorothy of Calton	Aged	9,176·0	559·333
J. Collins	Tingoora	Cynthia of Calton	Junior (2-year old)	6,947·0	371·78
J. Collins	Tingoora	Maud of Calton	Senior (4-year old)	8,264·25	450·417
B. J. Jensen	Rosevale	Hazel of Woodstock	Senior (2-year old)	4,912·125	281·797
B. J. Jensen	Rosevale	Ena of Woodstock	Senior (2-year old)	5,674·625	304·663
B. J. Jensen	Rosevale	Managers Zebuda of Woodstock	Senior (2-year old)	4,856·5	216·278
Chas. Klaus	Mundubbera	Lily of Golden Hill	Junior (2-year old)	4,279·5	247·774
McGeehan Bros.	Kairi	Werribee Sweet Larkspur	Junior (3-year old)	7,414·55	352·413
McGeehan Bros.	Kairi	Inasfayl Bonney	Aged	9,222·35	478·269
T. A. Petherick	Locyker	Trecarne Carnation	Aged	6,444·825	381·356
T. Richters	Tingoora	Beauty 4th of Oaklands	Junior (2-year old)	7,171·625	278·595

* 365 Days.

CLIMATOLOGICAL TABLE—DECEMBER, 1929.

Supplied by the Commonwealth of Australia, Meteorological Bureau, Brisbane.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·83	91	78	102	16	74	2, 19, 20	157	5
Herberton	..	85	63	92	17, 22	58	8, 16	196	7
Rockhampton	29·85	93	71	102	22	63	4, 6	240	5
Brisbane	29·87	87	68	97	15	60	6	190	7
Darling Downs.									
Dalby	29·84	91	62	101	21	51	6, 17	428	7
Stanthorpe	..	84	54	97	10	39	7, 17	336	9
Toowoomba	..	86	59	98	10	47	5	332	8
Mid-interior.									
Georgetown	29·80	97	71	104	22	62	18	263	6
Longreach	29·78	100	72	110	22	58	4, 5	57	6
Mitchell	29·83	92	62	102	9, 24	49	6	253	7
Western.									
Burketown	29·80	95	76	102	17,18,19	72	30	316	5
Boulia	29·78	99	70	113	23	60	4, 5	30	4
Thargomindah	29·80	93	70	112	24	58	4, 5	9	1

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of December in the Agricultural Districts, together with Total Rainfall during 1929, and 1928, for Comparison.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Dec.	No. of Years' Records.	Dec., 1929.	Dec., 1928.
North Coast.	In.		In.	In.
Atherton	7·72	28	3·43	6·50
Cairns	8·69	47	5·99	3·75
Cardwell	8·27	57	1·66	3·83
Cooktown	6·87	53	1·64	3·07
Herberton	5·72	42	1·96	6·58
Ingham	6·99	37	1·13	8·78
Innisfail	11·84	48	0·76	10·34
Mossman	11·49	16	5·42	4·29
Townsville	5·58	58	2·19	3·76
Central Coast.				
Ayr	3·97	42	1·53	4·13
Bowen	4·46	58	2·99	2·10
Charters Towers ..	3·55	47	2·12	3·82
Mackay	7·40	58	3·30	10·10
Proserpine	8·38	26	1·05	10·10
St. Lawrence.. ..	4·78	58	1·04	7·80
South Coast.				
Biggenden	4·73	30	1·92	2·81
Bundaberg	4·96	46	6·24	1·19
Brisbane	4·90	78	1·90	2·56
Caboolture	5·24	42	4·23	3·88
Childers	5·78	34	1·84	4·29
Crohamhurst ..	7·12	36	8·91	4·24
Esk	4·70	42	4·18	9·64
Gayndah	4·17	58	2·04	3·28
Gympie	6·10	59	3·13	4·01
Kilkivan	4·59	50	3·27	2·71
Maryborough ..	4·77	57	2·45	5·10
South Coast—continued:	In.		In.	In.
Nambour	6·86	33	8·05	5·04
Nanango	3·87	47	4·03	4·90
Rockhampton ..	4·81	42	2·40	4·36
Woodford	5·69	42	6·69	2·79
Darling Downs.				
Dalby	3·22	59	4·50	3·09
Emu Vale	3·60	33	1·64	5·24
Jimbour	3·23	41	4·66	4·28
Miles	2·96	44	5·89	2·28
Stanthorpe	3·54	56	3·36	4·94
Toowoomba ..	4·37	57	3·32	5·91
Warwick	3·44	64	2·74	2·74
Maranoa.				
Roma	2·49	55	2·39	1·53
State Farms, &c.				
Bungeworgorai ..	3·08	15	1·74	..
Gatton College ..	3·64	30	2·39	3·52
Gindie	3·03	30	2·36	2·58
Hermitage	3·05	23	2·22	..
Kairi	6·69	15	1·39	3·29
Mackay Sugar Experiment Station ..	8·92	32	2·73	8·65
Warren	3·84	14	..	1·18

GEORGE G. BOND, Divisional Meteorologist

TWO STRAWBERRY LEAF DISEASES.

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

Leaf scorch and eye spot are the two most common diseases of the strawberry occurring in Queensland. Both are foliage diseases which are capable of causing severe damage to susceptible varieties during a wet season. As in this State the varieties susceptible to the one malady are usually resistant to the other, it is difficult to form an estimate of their relative importance, this being determined by the extent to which any one variety is grown in a district. Scorch is probably most severe in its effect on the plant. Both these diseases are found widely distributed throughout the New and the Old Worlds where they have been known for many years.

Leaf Scorch.

The disease known as leaf scorch shows up first as small purple spots on the outer older leaves of the plant. These gradually enlarge until they are $\frac{1}{8}$ to $\frac{1}{4}$ inch in diameter, remaining either a uniform dark purple or drying out in the central region to a dark brown. The centre never exhibits the light colour characteristic of eye spot. As the spots become older the leaf tissue immediately surrounding them becomes discoloured and dies, and, if they are at all numerous, as is the case when the disease has reached serious proportions, these areas will coalesce so that eventually a large area of the leaf turns brown and dries out. It is to the appearance of the brown and somewhat shrivelled areas commonly found working in from the margin that the disease owes its name of scorch. The leaves are affected in order of their age so that it is common to find plants badly attacked by the disease with their outer leaves brown and shrivelled, and those within showing a more distinct spotting which gradually becomes less until the younger leaves may be quite free.

Purple brown blotches may also be found on the stalks of the leaves and fruit. When these are attacked girdling may result in the loss of flowers and young fruit. In some cases clusters of minute black pustules may be made out on the upper and lower surfaces of an old spot. These represent the fruiting bodies of the fungus causing the disease.

It is sometimes difficult to distinguish scorch in its late stages from red spider injury. The latter commences as a light reddish-brown discolouration of certain relatively broad areas of leaf. These areas are usually indefinite and diffuse, and not in the nature of clearly defined spots. When these areas dry out they closely resemble the older stages of leaf scorch, but even then may be distinguished by the fact that on the under surface may be seen the remains of the delicate webbing formed by the red spiders—this usually being made more apparent by the collection of cast skins, soil debris, &c., held in its threads.

Cause.

The disease is caused by a fungus parasite known scientifically as *Diplocarpon earliana.* This fungus is distributed about a field by means of spores, which are minute bodies corresponding in function to the seeds of flowering plants. Should one of these spores be splashed or carried by air-currents so as to alight on a strawberry leaf, it is able,

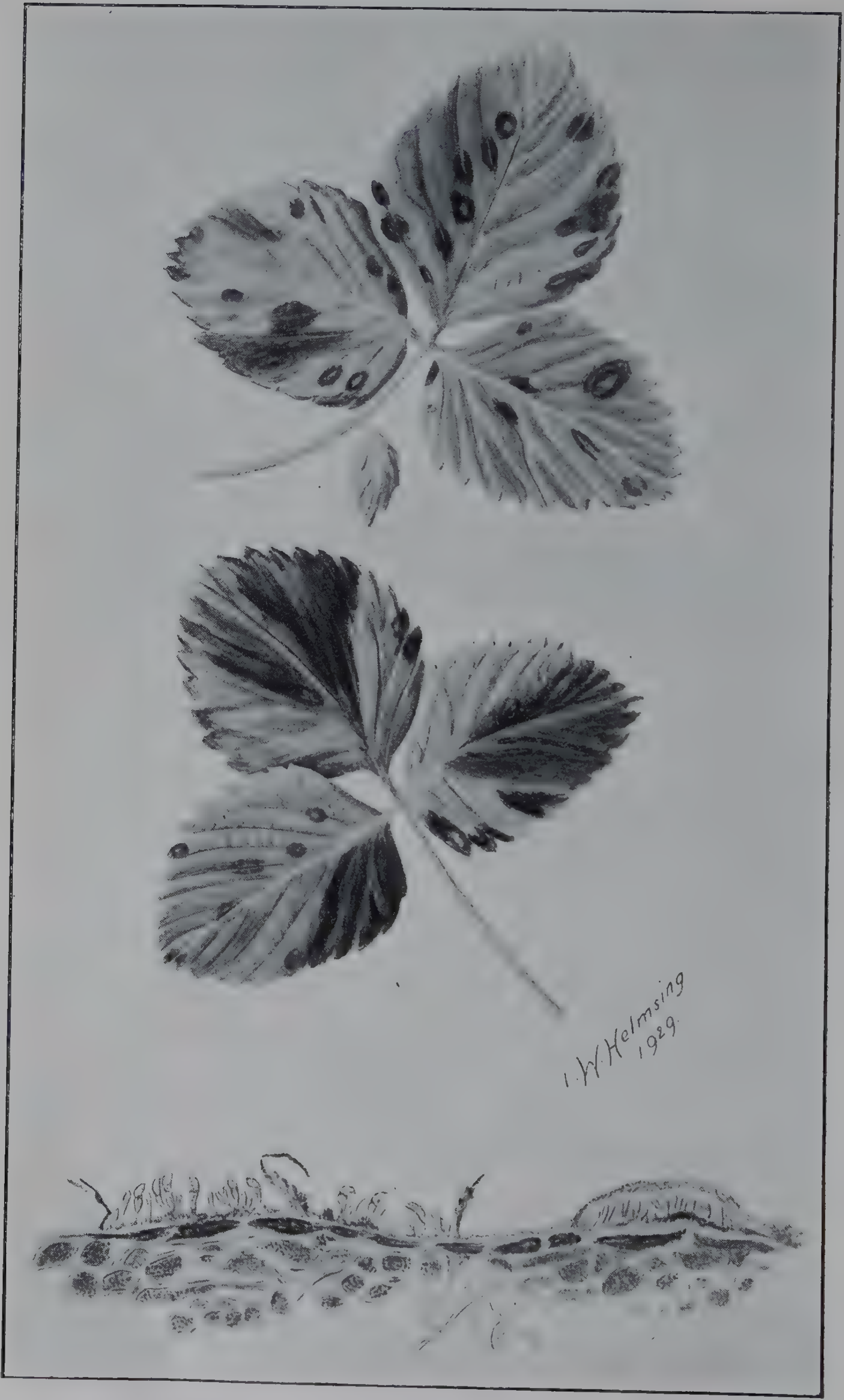

Plate 39.—Above: Strawberry leaves exhibiting symptoms of leaf scorch. Below: Section through a leaf lesion showing conidial fruiting pustules of *Diplocarpon earliana*. (Highly magnified.)

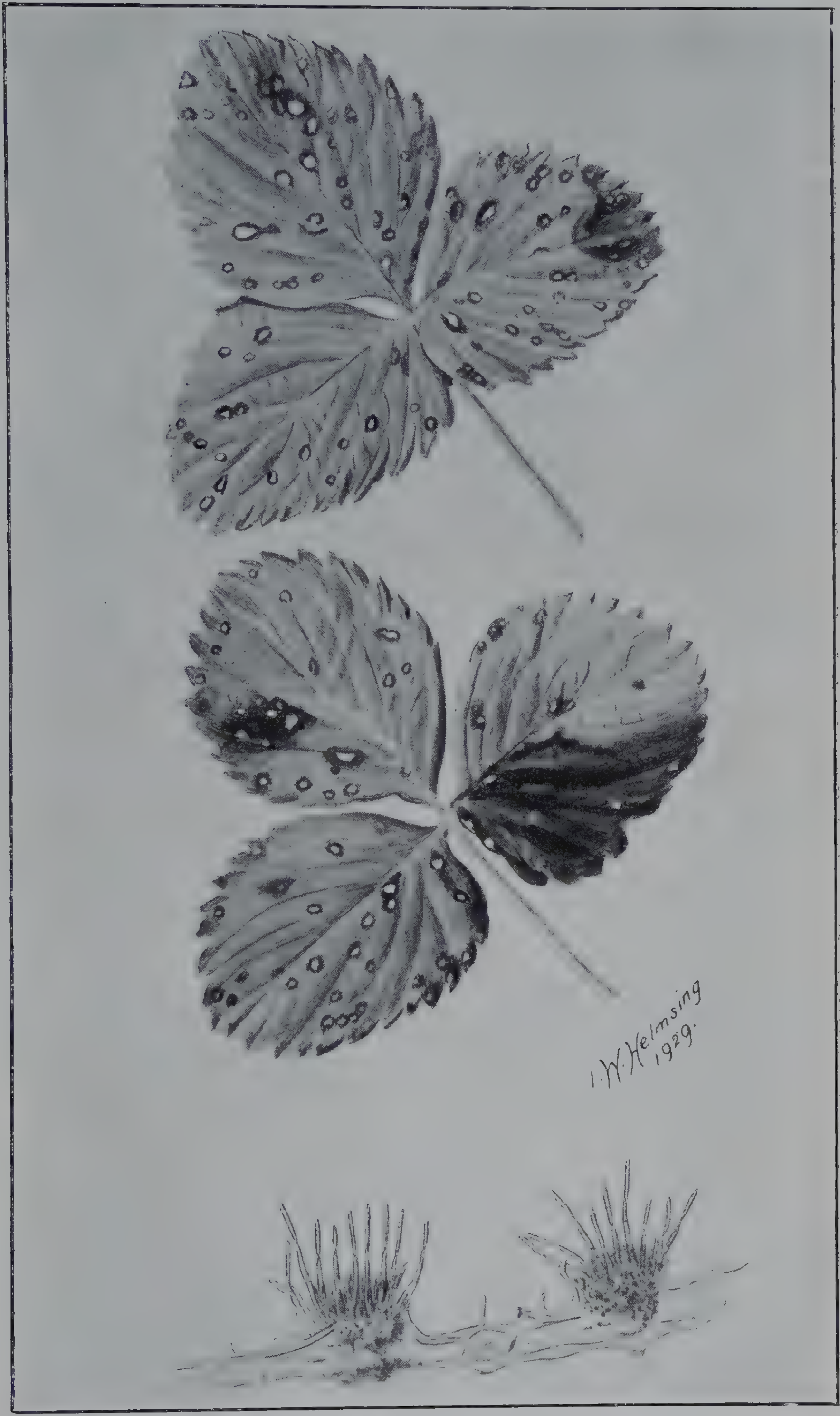
I. W. Helmsing 1929.

Plate 40.—Above: Strawberry leaves affected with eye spot. Below: Section through a leaf spot showing conidial fruiting bodies of *Mycosphaerella fragariae*. (Highly magnified.)

when moisture conditions are suitable, to germinate and penetrate the leaf-tissue by means of a delicate thread. This then forms numerous branches which gradually kill the leaf-tissue in their vicinity until finally a clearly visible and characteristic spot is formed.

In order to reproduce itself and further spread the disease the fungus after a time commences to form a batch of spores. In the present case two kinds of spore may be produced, of which the more common is that illustrated in Plate 39. In the process of spore formation the fungus threads accumulate at certain points beneath the surface, and from this bed short upright branches are given off which develop from their apex small, broadly sickle-shaped spores. This process ruptures the upper layers of the leaf and exposes the spores to the air, ready to be carried away to infect further plants.

Contributing Conditions and Susceptible Varieties.

Like most fungus diseases moist conditions, whether brought about by low, damp situations or excessive rainfall, are conducive to the development of this disease. In the 1928 season, when there was an exceptional amount of rain during the autumn and early winter months, scorch assumed epidemic proportions in some localities.

Of the two varieties most commonly grown in Queensland the "Aurie" is highly susceptible to scorch, while "Phenomenal" is resistant. "Usher's Special" resembles "Phenomenal" in being resistant. When considering the susceptibility of these varieties to eye spot the position will be found to be completely reversed.

Eye Spot.

The early stages of eye spot closely resemble those of scorch in that there appears one or more small purple dots on the surface of the leaf. These enlarge somewhat and soon commence to dry out in the centre to a light brown. This region after further drying turns a light grey to almost white colour. The mature spot then appears as a distinct rounded or somewhat angular white spot one-sixteenth to one-eighth inch in diameter surrounded by a narrow and rather diffuse purple border. As with scorch it is the older outside leaves on which spotting is most abundant. When the spots are fairly numerous the adjacent tissue turns yellow and eventually dries out. There is thus produced finally a dry, shrivelled condition of the leaves resembling that formed in the case of leaf scorch but clearly distinguished from the latter by the presence of the definite white spotting which is discernible even after the leaf has completely dried out.

Cause.

Eye spot is another fungus disease caused in this case by the organism known as *Mycosphærella fragariæ*. This fungus is spread about the field by means of spores in much the same manner as in the case of leaf scorch. To the naked eye the fruiting bodies appear as minute specks scattered over the older spots. Under the microscope each of these is seen to consist of a number of short threads projecting in a cluster from the surface of the leaf, from the ends of each of which may be formed a narrow elongate spore (Plate 40).

Towards the end of the season another type of spore may be produced. These are contained in small rounded receptacles, and may serve as one means by which the fungus lives over until the next season. The fungus can also exist for several months in the purely vegetative state in connection with the spots in old leaves and then, later, form spores which will infect a new season's growth.

Contributory Conditions and Varietal Susceptibility.

The same climatic conditions favouring scorch are also suitable for the development of eye spot. That is to say, excessive rain during the growing season will probably result in a serious outbreak with much defoliation and consequent reduction in crop.

Of the common Queensland varieties those susceptible to leaf scorch are resistant to eye spot, and vice versa. Thus, "Phenomenal" and "Usher's Special" are susceptible to eye spot, while "Aurie" is resistant.

Control of Scorch and Eye Spot.

(1) The fungi causing both scorch and eye spot live over from one season to the next associated with old leaf debris left in the soil or on the plants. Hence the method often adopted of renewing the plants each year, especially if fresh land and clean plants are selected. should greatly aid in keeping the disease under control. Old plants should be removed and burnt as soon as finished with in order to free the land from infectious material.

(2) If it is not intended to renew the plants all diseased foliage should be removed and burnt at the end of the season. Another plan is to mow the plants after the crop has been taken off, and after covering the dead leaves and plants lightly with dry grass run a quick fire over them.

(3) When planting, runners should be obtained from a locality from which leaf disease is absent, or at least from a plot in which this is not present to any extent.

If some of the runners are found to be affected the diseased leaves should be removed. Any plants badly attacked should be discarded entirely.

If it is not possible to obtain runners from a disease-free field, the mowing and burning mentioned above, followed by a Bordeaux spray as soon as the plants are commencing to shoot, will greatly aid in the production of clean runners.

(4) Avoid damp situations for strawberry planting.

(5) Other considerations being equal, use only varieties resistant to the disease most troublesome in the district concerned.

(6) Both leaf diseases can be controlled by spraying with a fungicide. Bordeaux mixture of 4.4.40 strength should be applied as soon as the new season's growth is well started. This should be followed by two or three further applications in order to ensure the leaves being kept well covered. These may be given up to the time that the first berries commence to form.

Spraying should not be expected to give satisfactory control unless attention is also given to the cultural practices mentioned above.

THE RECORD OF PERFORMANCE PLAN FOR SELECTING BREEDING STOCK.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

In several of the principal pig-breeding States of America, in Canada, in Denmark, in Great Britain, Germany, and other countries, "Record of Performance Tests" to determine the production ability of breeding sows are now being carried out on systematic lines and largely under departmental control. The centres where these tests are carried out are usually referred to as "Testing Stations," and to their activities much publicity has been given in recent years. In this article Mr. Shelton discusses these tests and recommends that a similar system be introduced into Australia in the endeavour to still further build up and stabilise our pig industry.—ED.

Record of Performance Tests.

ARISING out of correspondence with several prominent American authorities on swine production, and per medium of the Agricultural Press specialising in this line of industry, a good deal of information is now to hand having special reference to the Record of Performance Tests, a system of testing breeding stock (pigs) with the same objective in view as that arrived at in the testing of dairy cows—i.e., to ascertain their productive capacity and determine whether they are worth retaining in the herd or not. The system of brood sow testing is necessarily different from that obtaining in the case of dairy cows, for, in the former, the records of performance have reference to the capacity for production, the rate of increase in weight and the suitability of the type of stock produced for market requirements, whereas, in the case of dairy cattle, the principal objective is to ascertain the butter-fat content of milk and cream per the Babcock test, now universally in use in every dairying community.

Early Attempts.

Discussing the historical aspect of these tests, Professor E. F. Ferrin, and his associates P. A. Anderson and Don Johnson, of the Division of Animal Husbandry at the University of Minnesota, state that for several centures pigs have been selected and bred with the aim of producing stock which is economical in the use of feeds, and which yields carcasses of pork well suited to the demands of the consumer. Pig production in the United States on an extensive scale has been carried on for just about 100 years. During this time there have been many changes in type. These changes have come in the most part as a response to economic conditions, but there have always been other factors, some of them of little practical value, which have had considerable weight in the development of new types. It is just as true now as it was a century ago that the only reason for raising pigs is the production of pork in the most efficient way. But in reviewing the changes in type during the past century it is apparent that many times pig producers have been chasing rainbows rather than following strictly the most economical method of growing their stock.

The Position as it is in America.

Concerning the present-day type of pig, it is probable that producers are somewhere near the mark of greatest efficiency. However, it is not possible to say exactly in what points to-day's type of pig is most lacking in efficiency. There are many factors to be taken into account. The producer wants a pig which will make weight at a low cost. Brood sows must be prolific and good mothers, caring for their pigs carefully and nursing them well. No subsequent favourable influences can overcome the handicap of small litters at weaning time. The pigs must be hardy, resistent to parasites and disease, good feeders, consequently rapid in gains, and mature at an early age if they are to be money-makers. Above all, the pigs when fattened must yield carcasses which will comply closely with market demands. The demands of the pork consuming public must be satisfied if farmers are to make a profit from pigs.

It is a very difficult matter to gauge accurately the exact importance which each one of these many factors should have in forming the ideal type of pork or bacon pig. If pig producers are not now on the right road to the best type, the reason is the lack of accurate standards by which to measure the most profitable type. We have been selecting and breeding pigs very largely according to the appearances of the animal. Within fairly broad limits the kind of pig which can be produced at a low cost and which satisfies market demands, approximately, is known. But the difficulty is that we have had no measures which have told us accurately whether the type in popular favour was the most efficient or not.

Standards Set Up.

There is a standard which can guide pig production to the right type. Dairy cattle breeders have made wonderful progress in breeding for type and efficiency in production. The same success is possible in pig raising if accurate standards of measurement are adopted. Denmark for a period of approximately eighteen years has followed a plan of breeding pigs on the basis of low cost of growing pigs and high carcass value. A great improvement has been made in the profit derived from raising these pigs. The essential points of the system apply to pig raising in the United States just as the testing of dairy cattle here was based largely on the methods followed in Scandinavian countries.

The National Swine Growers' Association of America has endorsed the Record of Performance Plan which is being worked out by a committee of that organisation. This plan provides a standard for selecting pigs that are the most profitable pork makers. It comprises the feeding out of four pigs selected from a litter which is large enough to make profit on the pigs a possibility. The amount of feeds necessary to make a pound of pork during the growth and fattening of the pigs from weaning age to an average weight of 225 lb. each is determined. Two of the four pigs are slaughtered and the carcass value carefully determined. If the pigs of a litter make gains at a low cost, and produce carcasses of high value, the breeder of the litter should develop his herd by the maximum use of this strain of blood. At the Minnesota Experiment Station pigs are bought at weaning age from all breeders who desire to co-operate with the Experiment Station in the Record of Performance Work. In time a Register of Merit will be established in which are listed those boars and sows whose offspring have been tested and found to be profitable pork makers. Breeders who wish to improve their herds on the basis of this plan can select Register of Merit stock when buying boars or sows. Accordingly, the Record of Performance Plan provides the most economically sound basis for breeding pigs which has ever been proposed.

Recent Experiments in America.

Last year (1929) ten Minnesota breeders co-operated with the University by sending in to the Station pigs from eleven litters. The pigs were started on feed at the age of sixty-five days. Four of the first litters to arrive reached the final average weight of 225 lb. per pig, and two pigs from each litter were, up to time of writing in October, slaughtered. The pigs of each litter were fed as a group of four in a way similar to every other litter. Shelled corn was self-fed. A protein mixture of 50 parts of tankage (meat meal), 25 parts of linseed meal, and 25 parts of choice alfalfa meal (lucerne meal) was self-fed also. The mineral mixture which was self-fed was composed of 50 per cent. high calcium ground limestone, 27.97 per cent. bonemeal, 20 per cent. common salt, 2 per cent. iron oxide, .01 per cent. copper sulphate, and .02 per cent. potassium iodide.

There was found to be considerable variation in the average daily gain of the pigs from the different litters, in quantities and kinds of feed consumed, and, of course, in the feed cost per 100 lb. of gain. There was also a difference in dressing percentages and in the desirability of the cuts, apparent after slaughter.

Feeding.—The differences between lots were in the methods of feeding. Shelled corn was fed dry in all cases and the mineral mixture was self fed to each lot. Middlings (i.e., pollard), tankage, and buttermilk were mixed and fed as slop twice daily to Lot I. The same amounts of these feeds were fed twice a day to Lot II., but the tankage and middlings were in dry form. Lot III. was fed the same as Lot I. except that all feeds were given three times daily. All dry feeds were self fed to Lot IV., and the buttermilk was supplied in a trough. Lots I., II., and III., which were hand fed, were given as much feed as they would clean up quickly at each time of feeding.

Housing.—Movable houses furnished shelter for the pigs and water was supplied each lot by automatic fountains. There was no difference in the type of the pigs, comparing one group with another when the feeding began. The pigs in this experiment were pure-breds of good type. Lot IV. showed a tendency to fatten more rapidly than the hand-fed pigs of the first three lots. The hand-fed pigs at the close of the feeding period appeared more growthy, and most of the gilts (young sows) were in good shape to be carried on for breeding purposes. The self-feeding method can be used for developing breeding stock if corn is not fed in this way.

American Conclusions.

1. In this experiment the pigs fed slop made a little more rapid gains than those which were hand fed the same feeds in dry form. This resulted in a smaller total quantity of feeds for 100 lb. of gain.

2. Feeding twice daily was just as satisfactory a method as feeding three times daily.

3. The self-fed pigs made a little more economical use of their feeds than the hand-fed pigs.

4. When feeding pure-bred pigs, slop feeding is a desirable method. For market stock self-feeding is the best method if the pigs are on full feed.

Because a few records do not give an accurate picture of average conditions, the breed of the litters are not listed. Each breeder who co-operates with the Experiment Stations receives a report of the pigs which he sent in. This is a reliable basis upon which to judge the value of the particular strain of breeding.

The Record of Performance testing will be continued in 1930. Pigs from sixteen litters can be fed out at University farm. While some changes in details are probable as experience shows the right way to establish the work on a permanent basis, the essential features of the plan will be as they are at present. Record of Performance work has the possibility of working greater improvement in the pig business than any other plan which has been tried in the United States.

The Experiment Stations want breeders to co-operate by selling it four pigs from one litter at weaning time to be tested. The litter should be from a desirable line of breeding. The sire and dam of the litter should be kept so that if the pigs make good records the strain can be increased in numbers rapidly. Nominations of herds will be accepted at any time and as many pigs fed out as the equipment of the piggeries will accommodate.

These American Records of Performance tests are still in progress at the Minnesota and Wisconsin and Iowa Experiment Stations (U.S.A.), and are being extended as opportunity offers to other countries. It will be noted that to set the recording of pigs along these lines into motion, it is necessary for interested bodies to get together and make the necessary arrangements for the tests to be carried out at some recognised experiment station, agricultural college, and/or on selected farms. Breeders desirous of co-operating arrange to send four pigs from a litter, two sows and two barrows, to the Testing Station as soon after the weaning as is possible. These pigs are then fed out under identical conditions with all the others on test. If so arranged the pigs are donated to the Testing Station or they are paid for at market price at the time they are sent in, and the breeder if he so desires may buy back one of the sows for breeding purposes at the same price. At the end of the test the other three are killed, records compiled on the rapidity and economy of gains, and the carcass and dressing efficiency are then rated and duly entered up.

The tests are referred to as intensely practical and as providing a reliable medium through which breeders of pigs may secure infinitely more reliable data as to the value of the breed sows and of the blood lines (other than of their ability to produce show-ring winners) than is obtainable through any other system. It is predicted by Dr. John M. Evvard that these tests will become the "Babcock tests of the pork-producing industry." For the first five years of the tests in America comparative figures on the different breeds will not be made public—after that they will be. As the breed sows in these tests are rated so will the breeds they represent be, hence it is highly desirable that all stock used in the tests should be of the very best it is possible to obtain in the breeds, otherwise the results would be misleading and a distinct detriment to the breed.

Queensland Tests.

Breeding tests in Queensland are at present in full swing at the Queensland Agricultural High School and College piggery, but these tests are not altogether on the lines of records of performance, though they aim at securing valuable and reliable data on early maturity, economy of production, suitability for market requirements, and prolificacy, all very special and necessary features in the production of stock for any market. The pigs resultant from these experiments are bacon pigs, the scheme aiming at a general improvement in this particular class of stock. The matter is one well worthy of the attention of Stud Pig Breeders' Societies, of Pig Industry Committees and other bodies, and it is hoped these notes will pave the way for the initiation of tests in this part of the world, where pig raising is looming large in public favour and where the farmers as a whole are intensely interested.

Further particulars regarding the Record of Performance Tests, Testing Stations, &c., may be obtained by writing to the Department of Agriculture and Stock, Brisbane.

PLATE 41 (Fig. 1).

Westbrook Ruby 3rd (8898) and her litter of twelve. A noted brood sow of the Berkshire breed, bred and owned by The Farm Home for Boys, Westbrook, Queensland, where a stud of high-class Berkshire pigs is maintained in full profit, and whence many productive and prominent prize-winning animals have been distributed. Sows of this description are profit-makers of the very best type.

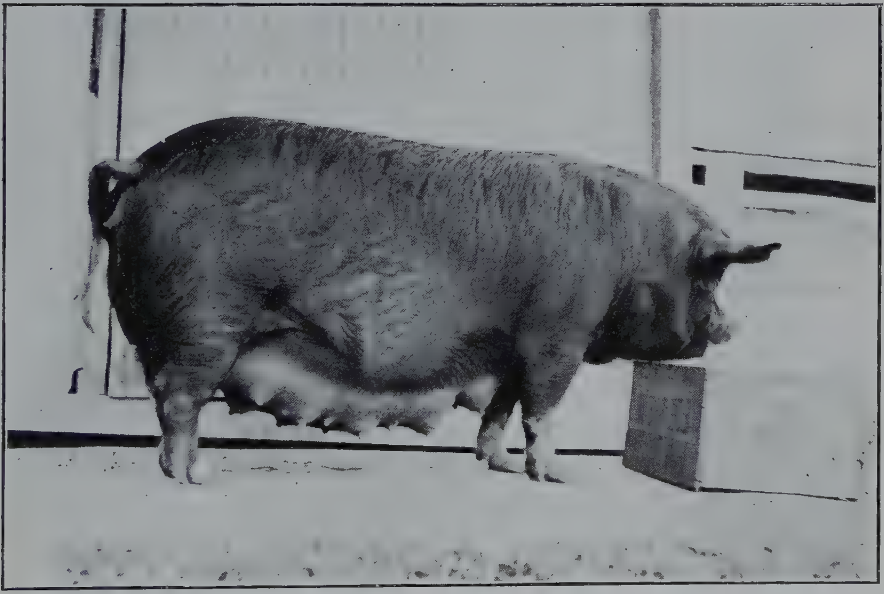

PLATE 42 (Fig. 2).

Berkshire Sow, Gatton Pamela (8748), bred at the Gatton College and now owned by Mr. A. Drescher, of Pimpama, South Coast, Queensland. Note length and depth of body, development of teats and udder, and generally superior quality of this typical brood sow.

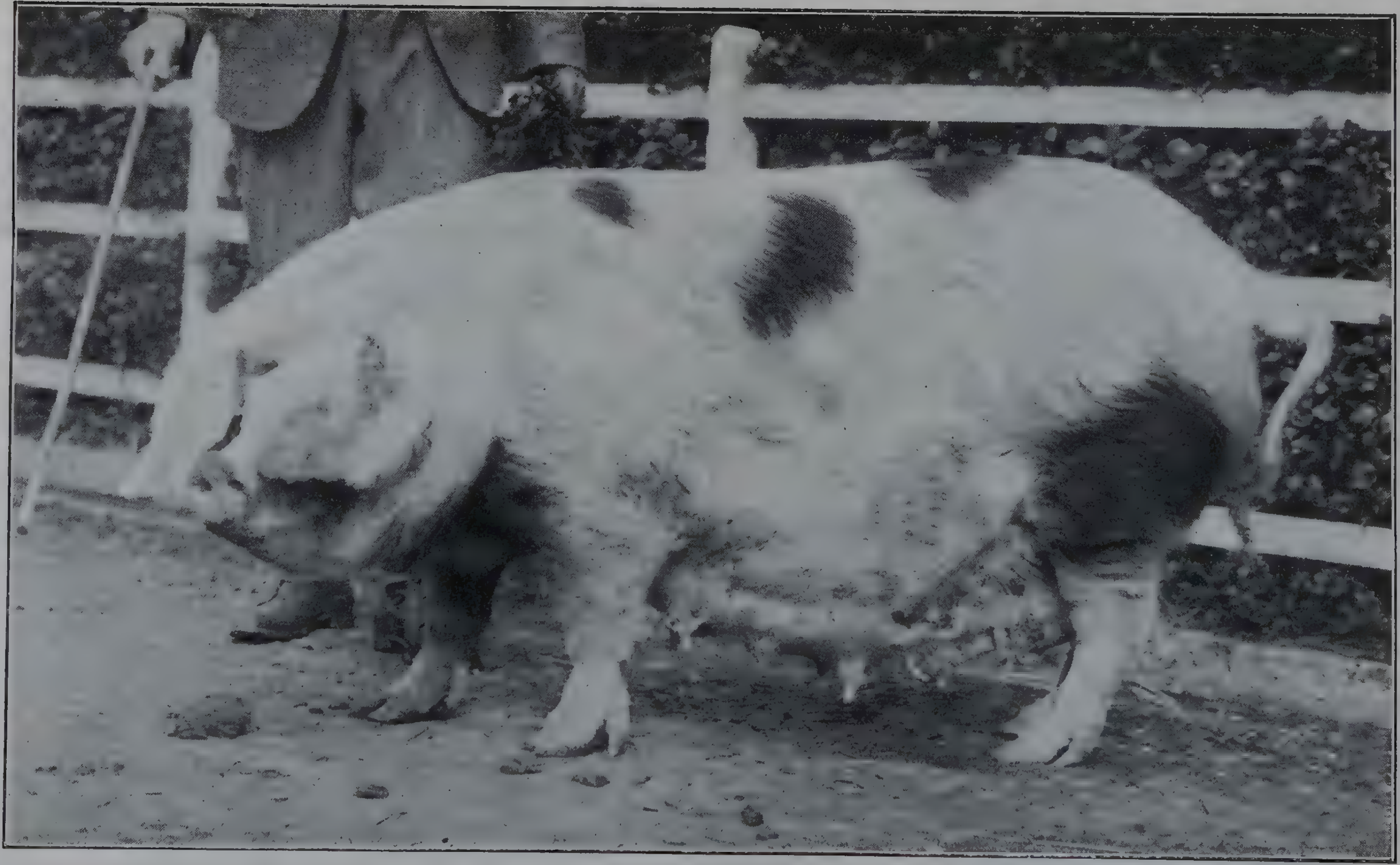

PLATE 43 (Fig. 3).—CHARTERHOUSE LADY (91), CHAMPION GLOUCESTER OLD SPOT SOW, MELBOURNE ROYAL AGRICULTURAL SHOW, SEPTEMBER, 1929.

Exhibited by Mr. A. E. Ball, a noted breeder of G.O.S. Pigs in the Southern State. Note pure quality, roomy body, shape of ears and colour markings.

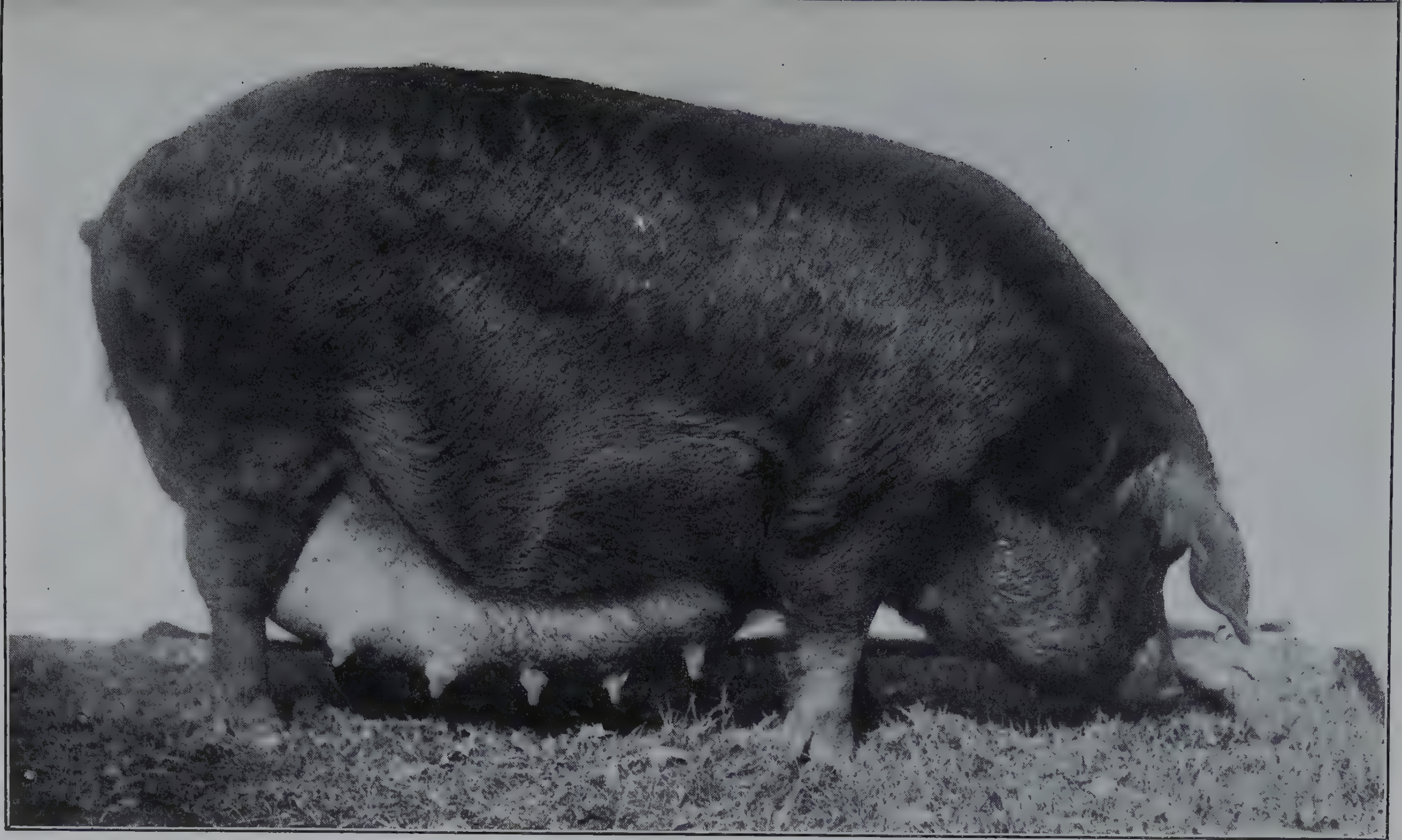

Plate 44 (Fig. 4).—Champion Duroc-Jersey Sow at the Royal National Show, Brisbane, 1929.

This wonderful sow, Yamsion Flower (now unfortunately deceased) was bred by Mr. W. Koehler, of Yamsion, *via* Dalby, and was owned and exhibited by Mr. Alan F. Conochie, of Tingoora. Yamsion Flower set a very high standard among Duroc-Jersey Pigs in Queensland, and her type, quality and general excellence appealed to all. Her capacity as a breeder was clearly demonstrated by the production of a very fine sturdy litter of eleven Durocs a few days before her death. Her dam, Lawn Hill Flower, bred by Mr. Percy V. Campbell, and owned by Mr. Koehler is also a very fine animal.

THE QUEENSLAND PIG INDUSTRY IN 1929.

REVIEW OF A YEAR'S PROGRESS.

By E. J. SHELTON, Senior Instructor in Pig Raising.*

Statistics.

The Stock Returns for the year just ended are not yet available, but during the year we were advised by the Registrar-General's Department that at the 1st January, 1929, there were 215,764 pigs in Queensland, an increase of 23,817 head over the number recorded during the previous year. This number, 215,764 head, is above the general average of around 200,000, but it is not abnormal, nor could it be said it represents an unusual increase over the records of the past twenty or more years. It really represents a normal pig population, a safe number considering the uncertain nature of the seasons and the state of the pig markets generally.

In Queensland we have about one-fifth of the total number of pigs recorded in the Commonwealth, and on recent figures we have approximately 22 pigs per cent. of human population, which compares more than favorably with that of any other country in the world with the exception of Denmark, the United States of America, Canada, the Irish Free State, New Zealand, Germany, and South America, all of which have a much larger pig population per cent. of human population than is common in this country. In comparison with the Statistics of Human Population there are more pigs in the Northern State than in either New South Wales, Victoria, or the other States, though actually both New South Wales and Victoria carry more pigs than we do in normal years.

Present and Future Prospects.

It is apparent there is little or no prospect of any appreciable increase in the total number of pigs kept on farms while market conditions are unsettled and while the seasons are so variable, though it is safe to say there is no indication that the numbers are likely to suffer any serious decrease as a result either of unsettled markets or normally uncertain years. A long continued severe drought would certainly have a very serious effect, just as uncertain and unfavorable seasons check our progress and limit our production, nor are these conditions likely to alter so long as we are dependent entirely on local and interstate markets for our pork products. The normal increase in production can readily keep pace with increased demands, for, after all, we are not actually a pork-eating people; and, generally speaking, pork products, i.e. fresh pork, bacon, and hams and smallgoods are really looked upon more as luxuries than as actual necessities in Queensland homes, and until the producers and manufacturers of these products enter upon an extensive scheme to largely increase home consumption of these very appetising and nutritious articles of diet, we cannot expect any marked increase in the trade.

Knowledge of the Job—An Economic Phase.

In the pamphlet entitled "Pig Raising in Queensland," issued earlier in the year 1929, and still available for distribution gratis to those interested, various economic phases of the industry are dealt with, and stress is laid on the necessity of increasing our knowledge of the job before entering upon any extensive scheme for increased production. Therein it is stated that pig raising is one of the industries associated with dairying and mixed farming in which every farmer in Queensland is interested. As with other branches of agriculture the production of pigs is a business requiring specialised knowledge, though it may appear to the uninitiated there is nothing to be learned about feeding and handling pigs. Fortunately, the business is not one requiring a large capital or an expensive plant, particularly where it is associated (as it invariably is) with dairying and general farming. The provision of aboundant supplies of suitable foods, a liberal, and we may add, permanent water supply, clean comfortable accommodation, and necessary utensils are among the principal requirements, once the farmer is actually situate on a farm where it is possible to grow the necessary food and where conditions are favourable for the keeping of pigs and other stock. The specialist who intends devoting the whole of his time and a large capital to pig raising on commercial lines will, of course, work on different lines to the dairy farmer or to the suburban farmer who keeps a few pigs, or to the farmer engaged principally in the production of stud pigs.

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* In a Radio Talk, broadcast from 4QG.

Plate 45.—Young Pig Farmers in the Making.

The Senior Instructor in Pig Raising (Mr. E. J. Shelton) conducting a practical demonstration before a small group of Pig Club members at Mapleton, on the Blackall Range. The Head Teacher of the Mapleton State School (Mr. Radcliffe) is on the left of the group.

Plate 46.

Mr. Shelton discusses matters of mutual interest with the Sullivan children, members of the Jinghi Gully Pig Club in the Jandowae district. Mrs. Sullivan, the mother of these sturdy Queenslanders, is President of the local branch of the Country Women's Association and, with Mr. Sullivan, is a prominent worker in all progressive schemes.

However, no matter what line the farmer may work on in carrying pigs among his farm stock, it is essential that careful consideration be given to the financial side of the proposition and especially at the outset, while all along continuous attention is necessary to factors that determine the profit and loss in the carrying out of the activities.

One certainly needs a sound knowledge of the job in order to make a success of it, while in addition one must really be keenly interested and have a love for the job if he is to stick at it and make it a commercial success.

Are Queensland Pig Raisers Efficient.

In reviewing the work of the year one may well ask the question: "Have we proved as efficient at our job as we should be, or are we lacking in any special direction?" Generally speaking I think it will be admitted that Queensland farmers are just as efficient at their jobs as are the farmers resident across the borders of the several States with whom we are bound up in this great Commonwealth, for our sheep and wool, beef cattle and dairying industries are quite up to the standards of the other States, while in sugar, fruit, and corn, cotton, wheat and other industries we have some of the best farmers in the Southern Hemisphere.

Nevertheless it must be admitted that, generally speaking, our pig raisers have yet a great deal to learn before they can be classed as efficient as they ought to be. The conditions under which pigs are kept on many farms and the general neglect in housing and accommodation bespeak a lack of knowledge or appreciation which is a hindrance to progress, and it is along these lines and in the use of better quality and more efficiently balanced rations that we need to specialise. I believe it will generally be admitted that the class of pigs kept on Queensland farms has improved to such an extent during recent years that we now compare more than favourably with our neighbours, though even in this direction there is room for improvement. We also need to pay more attention to marketing our pigs in a condition more suited to the requirements of the factories, for the industry still suffers a heavy burden of loss through the marketing of pigs in an overfat and overweight condition and from various other hindrances to the securing of the maximum price for every animal sold. We do not as yet make the fullest use of green stuff, of mineral matters, and even of drinking water, and in all these lines it is hoped we will record improvement during the coming year. We certainly need to be efficient for there are many pitfalls and stumbling-blocks to progress.

Teaching the Juniors.

It will be of interest to readers of this talk to know that there has been a marked increase in the number of boys and girls actively interested in the Pig Club movement, and to know that the year 1929 has been the best year we have yet experienced in this class of work. We have had close on 1,000 members specially interested in Pig Club work, plus a big army of children working in poultry and calf clubs and in other activities associated with the Home Project Scheme. These club members are taught to be efficient, and in almost every instance they have shown a remarkable aptitude and have indicated by their work that they thoroughly appreciate the necessity for giving strict attention to careful selection, breeding, feeding, accommodation, exhibition, and marketing of their stock. They are keenly interested, and we wish them all a very Happy and Prosperous New Year.

Schools of Instruction.

The Annual School of Instruction to Pig Farmers held at Gatton College (June, 1929) was a great success, and will be repeated again at the College in June, 1930, and we take this opportunity of making special mention of these Schools of Instruction, for they are of the utmost value and provide an excellent opportunity for those interested to get together for the mutual benefit of all concerned.

Visits to Factories.

We hope that in 1930 many other parties of farmers will make it convenient to visit the several bacon factories to see for themselves the conditions under which their pigs are handled and the various methods of manufacture and disposal. It is the right of every producer to study the methods of manufacture and to follow his products through the factories to their ultimate destination.

A BRITISH PIG RECORDING SCHEME.

Discussing the subject of Pig Recording as carried out by the Animal Nutrition Research Institute of the University of Cambridge, Department of Agriculture, England, in the first report (issued June, 1929) of the East Anglian Pig Recording Scheme, H. R. Davidson, M.A., Dip. Agric., and A. N. Duckham, M.A., Dip. Agric., have this to say as outlining the initial steps of these experiments:—

The Pig Recording Scheme.

Pig Recording is a subject which has recently come to the fore as a method of assisting and improving the pig industry in the same way that the measurement and recording of yields have proved invaluable to the dairying and poultry industries of this country. Our Scandinavian and other competitors for the English pork and bacon markets have for some years adopted the accurate recording of prolificacy, rate of maturity, feed consumption, and quality as an instrument of progress, which not only measures the efficiency of the sows, but also yields valuable data and figures on the status and efficiency of the whole pig industry in any one area. In Great Britain there exists a plethora of opinion on the various problems of pig keeping and on the relative value of the many breeds of pigs, and this initial report may be welcomed as one of the first attempts to substitute quantitative facts and measurements for such qualitative opinion. It is, therefore, opportune that it should appear at a time when so much attention is being focussed on pork and bacon production by the British Pig Industry Council, the Imperial Economic Committee, and other bodies.

Recording Methods.

After an interesting foreword by Professor T. B. Wood, the report deals with various methods of pig recording employed abroad, and points out that, although none of these methods can be considered suitable by itself for English conditions, the East Anglian scheme is partially based on foreign experience, but it is designed to obtain the essential data for the pig keeper with the minimum of trouble and expense. It is also shown that the value of any pig recording scheme lies not only in the information and facts it gives the farmer, but also in the way in which accumulated records can be used statistically to solve many of the pig keeper's problems, such as the most suitable herds or methods of management or the best age for castration. In addition, it helps to provide the much-needed liaison between the farmer and the research worker.

Results Obtained.

The second section of the report summarises the results obtained from the various herds. From these records it is estimated that the difference per bacon pig in the cost of production between the best and the worst herd was over £2 per pig in the eighteen months under review. The best herd marketed eight pigs from each litter and took seven months to make a bacon pig of 150 lb. dead weight, whilst the worst herd marketed only four pigs per litter, and required ten months on the average to reach the same weight. The average of all litters recorded was six pigs marketed per litter at 150 lb. dead weight in nine months. This illustrates the way in which pig recording can show the farmer his efficiency as a pig keeper, and it is interesting to note that in some of the less successful herds certain defects in feeding and management have been located, such as the feeding of unbalanced rations deficient in minerals and protein.

The scheme has not been in operation long enough yet to permit of the collection of information relating to the elimination of unprofitable sows and boars, but unsolicited opinions from farmer members, who must be the ultimate judges of the value of pig recording, indicate that they thoroughly appreciate its value, even in the relatively short time it has been running.

Other Information.

Subsequent sections present data on such questions as length of gestation, the intervals between farrowings, the relative weights at weaning of gilts and sows' litters, &c. Figures are put forward to show the paramount importance of weaning a large number of sound, healthy pigs per litter, and it is interesting to note the differences in the mortality before weaning and in the bacon quality of the two sexes.

With regard to quality, when ready for market many of the pigs were recorded at two East Anglian bacon factories, and it is shown that only two-fifths of the bacon pigs received were suitable for the better class trade. The chief faults were too thick back fat, heavy shoulders, and deficient length (in relation to weight), and the authors point out that these difficulties could partially be avoided if farmers were encouraged by the Wiltshire bacon curers to market their baconers at lower weights.

The report concludes with a section outlining the possibilities of the general adoption of pig recording in this country as a method of helping us, as pig producers, to fight and excel our continental and other competitors.

Copies of this report and of the second report (issued October, 1929) may be obtained on application to the Organiser, East Anglian Pig Recording Scheme, Department of Agriculture, University of Cambridge, England, at a price of 1s. 2d. each posted, or through the Senior Instructor in Pig Raising, Mr. E. J. Shelton, Department of Agriculture and Stock, Brisbane, to whom also inquiries may be addressed.

SCRUB TICKS IN SHEEP.

J. L. HODGE, Instructor in Sheep and Wool.

The Department had occasion during November to look for a cure for sheep attacked by scrub ticks. Messrs. Cobb Bros., of Windera Creek, near Murgon, reported the loss of about 250 sheep. Major A. H. Cory, M.R.C.V.S. (L.), Chief Inspector of Stock, has always advocated the use of trypan blue in the case of dogs, foals, or calves attacked by the pest, and authorised the writer to recommend its use in the case of sheep.

Trypan Blue as a Remedy.

This remedy was given to Messrs. Cobb. Bros., with excellent results:—

A 2 per cent. solution (about 9 grains to a fluid oz. of water) is made by dissolving the trypan blue in boiling water. A sediment falls as the solution cools, and this should be removed by filtering through a funnel in which a properly folded filter paper is placed, or a fine piece of clean linen which has been previously boiled. The solution is used. The hypodermic syringe and needle before being used should be placed in a dish containing water, then placed over the fire and boiled for ten minutes. This is now ready for use when the solution has cooled.

The injection can be made anywhere under the skin, and in the case of sheep I recommend under the arm where the skin is free from wool. A fold of skin is caught up with the fingers of the left hand and the needle manipulated with the right hand.

The dose for sheep is 1 to 5 tablespoonsful. A second dose may be given twelve hours after the first should it be deemed necessary.

Messrs. Cobb Bros. report the effectiveness of the remedy in three cases.

No. 1 was a sheep down for two days. This sheep had the first injection on a Thursday morning, and on the Friday following another dose was given. On the Sunday the ewe was noticed eating and drinking and going about on her hind legs and knees. Next day she was up and recovered.

No. 2 sheep could not walk a chain without falling. An injection was given, and two hours later the ewe walked away with the rest of the flock from the shed.

No. 3 was a ewe heavy in lamb lying alongside a dam. The injection was given in the afternoon, and next morning the ewe was up and feeding with the flock.

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

MERINO WOOLS IN QUEENSLAND.

By J. L. HODGE, Instructor in Sheep and Wool.

MUCH has been written within the past few years in the daily papers and the periodicals with regard to the loss in quality in Queensland wools during the last twenty years. In this connection it is interesting to note, and also important to every branch of the trade, that the main point in this discussion has been consistently missed by most of the writers expressing their opinions. This is probably accounted for by the fact that the writers referred to are, in nearly every case, associated with the wool in some shape or other after the product leaves the sheep's back. They are not the expressions of the breeders of sheep.

The point to which I have referred as having been missed is the constitution of the animal producing the wool.

The breeders of merino sheep in Queensland are, as a body, highly intelligent men, and experience has proved to them that to a certain minor extent only quality had to be sacrificed in the attempt, which has been highly successful, to evolve a profitable type of merino which was better fitted by nature to withstand the adverse seasons which have been in the past and which I am afraid will be more or less always with us.

Some thirty years ago it was common in the west of Queensland to find runs stocked with the ''Saxony'' type of merino. From this type 5 lb. was considered a good clip, and it was mainly from these sheep in Queensland and other parts of Australia also that this continent gained her pre-eminence as the fine wool merino country of the world.

Experience soon proved what a grave error the breeders of merino sheep in Australia were making, and with the further introduction into the field of breeding of the ''Vermont'' disaster would have been caused in a great many flocks if the mistake had not been recognised at a comparatively early date. To return to the ''Saxony'' type: This sheep, as has been stated, was considered as satisfactory when cutting, say, 4½ lb. to 5 lb. of wool. The fleece was of superfineness, spinning somewhere in the vicinity of 90 counts. The constitution, however, left everything to be desired, and the people of Australia generally owe thanks to those breeders of our merino flocks who recognised the menace to the national industry in time to rectify a mistaken policy which would have, if persisted in, ruined the industry for years.

To those constantly advocating ''fineness'' in our flocks there is something more to be said than the fact that we now have in Queensland a type of sheep able, to a great degree, to withstand hardship and generally scratch for his living, and that is on the question of finance.

A comparison of gross figures received from the two types of sheep under review would be surprising to most people. Manufacturers continue to preach quality, but are their buyers paying the price in proportion? Even at present low values it is safe to say that the well-bred Western merino would beat the Saxony type on actual figures by three to four shillings per head.

So much then for the result of figures, but of greater importance still is the fact that the grower of the type of sheep advocated has a great chance of pulling his flock through during periods of drought, whereas in the case of the superfine type the chances are all against him.

The advice we frequently get from manufacturing centres with regard to our loss in quality is mainly in the nature of a scare.

Australia, generally, is still the world's fine wool country, and by virtue of her geographical position and other considerations is likely to remain so.

This continent of ours, looked at from a pastoral point of view, is a very large place, and there is plenty of room for the breeding of all sorts of qualities to suit the different trade requirements. Above all, let the breeder of merino sheep breed according to his country and rainfall, and as regards Western Queensland in particular, let the breeder be advised, when in doubt, to lean towards constitution rather than the sacrifice of it.

One live sheep is better than a great many dead ones, and all sorts and conditions require the same feeding.

Personally, I hold no brief, as these notes may indicate, for the strong-woolled type of merino as against the fine-woolled sheep, except where it is clearly shown by the nature of the country that the selection of the type chosen mainly for constitution spells the difference between success and failure. A safe maxim for breeders to follow is:—Select the type of sheep most suited to your country, the rainfall, or lack of it, and stick to that type.

Finally, leave it to the manufacturer to "get the wind up" with regard to quality in our flocks. His interests are, of course, best served when he can purchase a 90 quality wool proportionately cheaper than a 66 count. It matters not in the least to the manufacturer or his buyer from what type of sheep his wool comes, whereas to the grower, who has to keep his flock alive at great expense, it matters a great deal.

Our breeders, taken generally, are not on the wrong track, and always provided they do not go to the other extreme with regard to constitution as against quality, and provided the industry gets some protection with regard to the export of our stud sheep, there is no need to fear the competition, except in a healthy way, of any country.

Australia has justly earned, and should be able to maintain, her fame as the chief merino country of the world.

Every true merino wool man loves to see and handle a fleece of super-quality wool, but the greatest of care should be taken, in the West of Queensland at any rate, to see that the constitution of our flocks is not sacrificed to quality.

At the time of speaking, the wool and sheep industry is in a depressed state owing to the drop in the price of wool. The country, too, has not had sufficient time to recover from the effects of the late drought, especially in the central districts.

When we remember that South Africa can produce wool at a cost of £5 per bale, whereas it costs us in Queensland in the vicinity of £19 per bale, it should give even the most uninitiated seriously to consider as to our economic conditions. South Africa, too, is nearer the world's markets. Is it right, then, to permit the export of our stud sheep, both ewes and rams? I would suggest that the export should be, at least, rigidly controlled even if not altogether prohibited.

The Department of Agriculture and Stock has, on figures supplied it by the Registrar-General, estimated that, provided no drought losses occur before the end of June next, there will be an increase of approximately 2,000,000 sheep, and 44,000 bales of wool over the period mentioned, in Queensland. Judging, however, on prices realised at the last June sales, it is estimated that even with this increase in sheep and wool the cheque to be divided amongst the growers will be approximately £1,000,000 less. What then is to be done?

Some advocate the reintroduction of the appraisement scheme which functioned so well during war years and afterwards; others assert that the cost of production must come down. These two methods both breathe of politics, with which this branch of the Department has nothing to do, but I unhesitatingly assert that there is one outlet in the growers' own hands. This is in the production of better sheep and of management generally. It costs just as much, and possibly more, to feed a bad sheep as a good one. Rigidly cull the breeding ewes, and spend a few guineas more on rams, being sure on expert advice, that the right type of ram is selected for the ewes.

It should be no very difficult thing for an interested breeder to put 1 lb. of wool per head on the flock over a period of, say, two years, without in any way sacrificing the constitution.

Beware of overstocking. To some extent the insurance of stock is in the owner's own hands. Dry periods have always been in the West and Central parts of Queensland, and one is far safer and surer of a profitable return when carrying numbers well within the capacity of the holding.

Maintain the health of the flock by the supply, when necessary, of a scientific lick making up for the deficiencies in the pastures ascertained after analysis.

Watch carefully for the appearance of worms, and drench before the damage is done. A neglected infestation of worms may quite easily reduce the value of the clip by one-half, besides the losses which would occur.

Change the flocks from pasture to pasture. A change to an apparently worse paddock will often benefit a flock.

Use discretion with regard to grass seed. Choose the most suitable season of the year for shearing.

Mate the rams so as to lamb at a time proved best in the district, and in general give the flocks that care and attention to which they so readily respond.

A great sum of money is lost to the growers of wool annually by faulty wool-classing. Evidence of this is seen in the various wool stores year after year. Employ only those classers thoroughly recommended. Both good classers and others are paid at the same rate. Why not employ a good man in this very necessary and important work?

At the present time this fair State of ours requires the individual help of every owner in the sheep and wool industry. Personal gains brought about by better sheep and better management are gains to the State also, and this should be the object of every owner.

DAIRY FODDER PLOTS.

By A. E. GIBSON, Instructor in Agriculture, and C. S. CLYDESDALE, Assistant Instructor in Agriculture.

> *The subjoined notes have already appeared in the Journal, and are reprinted in response to numerous requests from our readers in several districts in the State. They are of particular interest and value at the present time.—Ed.*

THE majority of farmers engaged in dairying do not appear to realise the advantages to be gained by the growing of crops to supplement pastures to tide their stock over the leaner months of the year.

With the object of introducing the system throughout the Northern, Central, and Southern coastal districts, where reliance is usually placed on Paspalum, Rhodes, and other grasses, certain crop trials were instituted by the Department of Agriculture and Stock to determine the best single crops or crop mixtures for the purpose, and to demonstrate also that the methods, as practised, are not out of reach or too elaborate for the dairy farmer to undertake.

In Southern Queensland the undermentioned farmers co-operated in carrying out trials with Dairy Fodder Plots during the past season:—A. Hulse, Yandina, North Coast line; F. C. Burton, Bridges, North Coast line; and J. B. Stephens, Nindooimbah Estate, Beaudesert.

The soil on Mr. Hulse's farm is a deep, alluvial type of dark-grey loam, fairly rich in humus, which has been under crop, principally maize, for several years. That on Mr. Burton's farm is a deep, light-red coloured, sandy loam, which has been under sugar-cane for a number of years, and, consequently, somewhat deficient in available plant food. Mr. Stephens's property is composed of rich, black, alluvial soil, situated on the banks of the Albert River, and is practically new ground, having produced only two crops, subsequent to which it was fallowed during the summer months.

No fertilisers were used on this occasion on any of the plots.

The rainfall recorded at Yandina Railway Station, which is ¾ mile from Mr. Hulse's, and 3 miles from Mr. Burton's property, was—

Month.	Points.	No. of Wet Days.
March	1,059	9
April	1,110	10
May	357	5
June	716	11
July	643	6
August	183	1
September	172	5

The rainfall for Beaudesert was—

Month.	Points.	No. of Wet Days.
March	487	13
April	453	13
May	213	11
June	792	9
July	652	6
August	31	2
September	205	12

Cultivation.—At Yandina the land occupied by plots was ploughed late in February, to a depth of 8 in., immediately after the removal of a crop of maize (grain), but turned up in a very rough condition; and later on, in March, was cross-ploughed and, prior to planting, was reduced to a fine tilth by means of the disc-cultivator, followed by the harrows.

At Bridges the land was ploughed and harrowed in March, and cross-ploughed and harrowed in May; these operations resulted in an excellent seed-bed.

PLATE 47.—PRINCE WHEAT AND VETCHES AT MR. A. HULSE'S FARM, YANDINA.

PLATE 48.—PRINCE WHEAT AND VETCHES AT MR. F. E. BURTON'S FARM, BRIDGES, N.C. LINE.

The plot at Nindooimbah was fallowed during the summer, and before planting was again ploughed, thus making a perfect seed-bed.

Sowing.—The heavy rain experienced in March and April delayed planting operations. The soil was not dry enough to plant until 16th May, which, under the circumstances, was rather too late to expect early supplies of Winter fodder.

At all plots the usual local practice of broadcast sowing was followed, seed drills being unavailable. When used in mixtures, peas and vetches were sown first and ''disced'' in, the cereals being sown on the disced surface—once harrowed, and then rolled.

The majority of the plots made rapid progress, particularly the early-maturing varieties.

Description and Varieties on North Coast.—The two varieties of wheat experimented with—''Prince'' and ''Patriot''—appear to be suitable for the coastal districts, being practically free from rust, and made excellent growth. When harvested, they averaged 5 ft. in height.

Ruakura and Algerian oats suffered considerable damage owing to excessively wet weather, causing them to lodge, and to be badly affected by rust. They reached a height of 3 ft. at time of harvesting.

Skinless barley suffered badly from the effects of rust, which appeared when the crops were 2 ft. high, in the ''shot blade'' stage.

Cape barley did fairly well, and when harvested averaged 4 ft. in height, producing a large amount of foliage, and showing only slight indications of rust.

Rye made quick growth, looked remarkably well throughout the growing season, and, when harvested, averaged 5 ft. in height.

In all plots the field peas did remarkably well, making vigorous growth throughout, and, when harvested, averaged 4 ft. 6 in. in height.

Vetches, which are usually rather slow in growth, produced a fair amount of foliage, and, when harvested, averaged 4 ft. in height.

Plots at Nindooimbah.—Throughout the plots, peas and vetches were considerably overgrown by the other cereals used, thus affecting the subsequent yields of fodder. The varieties of wheat—''Prince'' and ''Patriot''—made excellent growth, stooling well, and having but slight indications of rust. Although they were knocked about considerably by wind and rain prior to harvesting, they did not suffer any serious damage.

Skinless and Cape Barley.—During the early stages of growth, these varieties suffered damage from excessive rains, which caused them to lodge; opportunity was taken to make a first cutting, this being effected ten weeks from the date when the young plants first appeared above the ground. A subsequent cutting was made at a later date, details of which appear in tabulated form. Cape barley made most remarkable growth, but that of ''skinless,'' subsequent to the first cutting, was somewhat thin.

Ruakura and Algerian Oats.—The former, being much the earlier of the two varieties, stooled well, and resulted in a much heavier growth. Later on, however, it showed an inclination to lodge, and to rust. The Algerian oats were somewhat later in maturing, but stooled well; this crop also showed an inclination to lodge, and a susceptibility to rust.

Rye.—Owing to its early-maturing habits and favourable conditions, the rye made rapid growth, and was harvested on 13th August, averaging 5 ft. in height at the time.

By using a little judgment in selecting the right varieties to grow, and getting the first sowing in, say, towards the end of March or April, a plentiful supply of green fodder should be available from early August until practically the end of October, by which time the spring growth in pastures should be well advanced.

In all plots, each of which contained one-tenth of an acre—

Wheat was sown at the rate of 60 lb. per acre.
Barley was sown at the rate of 50 lb. per acre.
Oats was sown at the rate of 40 lb. per acre.
Rye was sown at the rate of 60 lb. per acre.
Field peas was sown at the rate of 30 lb. per acre.
Vetches was sown at the rate of 20 lb. per acre.

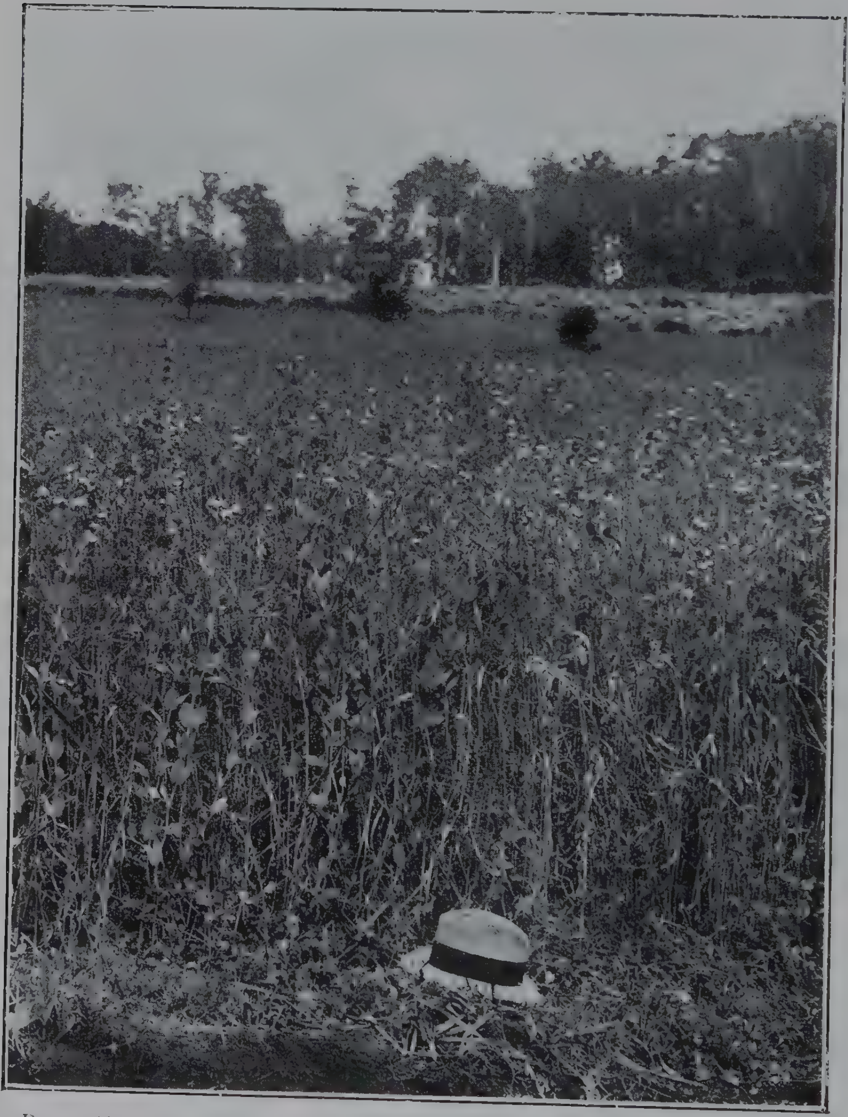

PLATE 49.—PATRIOT WHEAT AND FIELD PEAS AT MR. F. E. BURTON'S FARM, BRIDGES, N.C. LINE.

RESULTS.

Varieties.	YIELDS PER ACRE OF GREEN FODDER.											
	A. Hulse, Yandina.				F. G. Burton, Bridges.				J. B. Stevens, Nindooimbah.			
	T.	C.	Q.	LB.	T.	C.	Q.	LB.	T.	C.	Q.	LB.
Prince wheat and peas	16	16	2	12	2	14	0	2	13	10	0	10
Prince wheat and vetches	10	16	0	8	6	1	2	4	11	17	2	20
Patriot wheat and peas	16	4	0	12	9	2	0	0	14	0	3	16
Patriot wheat and vetches	11	6	3	4	2	0	2	1	12	18	1	26
Rye and peas	10	16	0	8	5	5	1	9	14	11	2	22
Rye and vetches	7	11	1	0	Destroyed by wallabies				16	4	0	22
Cape barley and peas	12	3	0	9	10	16	0	8	13	10	0	10
Cape barley and vetches	7	11	1	0	2	19	1	19	(two cuttings) 15	2	2	0
Skinless barley and peas	11	6	3	14	Destroyed by wallabies				5	18	3	10
Skinless barley and vetches	5	13	1	21	Destroyed by wallabies				5	2	2	15
Ruakura oats and peas	9	9	0	7	4	3	2	25	18	18	0	14
Ruakura oats and vetches	7	11	1	0	Destroyed by wallabies				17	16	2	2
Algerian oats and peas	8	18	1	1	3	6	0	19	9	3	2	18
Algerian oats and vetches	6	15	0	5	Destroyed by wallabies				9	14	1	24

The yields generally on Mr. F. G. Burton's plots were reduced by the depredations of wallabies.

PLOTS AT TOOGOOLAWAH.

For some years the Department of Agriculture has endeavoured to interest dairymen and stockowners generally in the matter of fodder provision for their herds during those periods when, by reason of the lack of succulence in the natural pastures, yields from their herds have been considerably lessened, and, in some cases, even reduced within measurable distance of vanishing point.

The practice of arranging with interested farmers to carry out trials designed and supervised by officers of the Department, has met with a good deal of success. The results to date have clearly shown that by early and careful preparation, heavy returns are readily available of rich, succulent, milk-producing fodders, and that a continuity of this class of food can in normal seasons be kept up to tide milch cows over periods during which their productivity is affected by the gradual depression, induced in each animal's system, by being called upon to make use of rough grasses of low nutritive value, at a time when weather conditions were at their worst.

Ocular evidence has shown that improved milk supplies and a correspondingly improved return from the factory is inducement enough for other neighbouring farmers to profit by the example of the one who first adopted the system of growing crops regularly, for his dairy stock—actually, on a farm, an inexpensive method of maintaining an income.

In the present crop trials carried out on Mr. T. Coleman's property at Toogoolawah, no fertilisers of any kind were used. The plots were situated on well-prepared alluvial soil near Cressbrook Creek, which had been under cultivation for a number of years.

The plots were sown on 31st March, 1925, and were harvested for yield-computing purposes on 30th July, 1925, consequently each yield submitted represents four months' growth of fodder, and judged on this basis may be considered as highly satisfactory.

A more vigorous growth was noticeable in the case of Florence wheat and peas or tares and the Skinless barley with a similar mixture, both of which were well out in ear and rapidly maturing; rye had made a dense growth in both instances, but only a few heads were to be seen, and probably a further three or four weeks would be required to bring it to a similar state of maturity to that obtained by the Florence wheat at date of harvesting. The following yields were recorded:—

	Per acre.			
	Tons.	cwt.	qr.	lb.
Florence wheat and peas	7	14	1	4
Cape barley and peas	9	11	1	0
Skinless barley and peas	10	15	1	0
Rye and peas	8	10	1	12
Algerian oats and peas	8	3	3	20
Canary seed and peas	11	8	0	24
Florence wheat and tares	7	4	2	16
Cape barley and tares	9	0	0	0
Skinless barley and tares	11	1	3	4
Rye and tares	12	13	3	20
Algerian oats and tares	10	15	1	12
Canary seed and tares	8	10	1	12

PLATE 50.—FLORENCE WHEAT AND TARES AT T. COLEMAN'S, TOOGOOLAWAH.
Yield—7 tons 4 cwt. 2 qr. 16 lb. per acre.

In view of the fact that some of the plots might be regarded as too immature for the purpose of obtaining the maximum yield, further weighings for comparative purposes were made on the 24th August, with the following results:—

	Per acre.			
	Tons.	cwt.	qr.	lb.
Alberian oats and peas	11	9	3	12
Rye and peas	8	13	2	8
Canary seed and peas	7	17	2	0
Algerian oats and tares	13	19	2	6
Rye and tares	9	9	2	16
Canary seed and tares	13	14	3	8

When selecting fodders for the test, cognisance was taken of their respective periods of maturity so that a continuity in the supply of green fodder might be kept up. Obviously the grower by using judgment in the matter of arranging for succession sowings should readily be able to maintain his supplies, and in this way ensure a more regular state of productivity in his herd.

Observations made respecting the period of development of the different crops were as follows:—Florence wheat and Dun field peas were ready for use earlier than any other single crop or combination, followed by crops in the order named: Florence wheat and tares, Skinless barley and peas, Cape barley and peas, Skinless barley and tares, Cape barley and tares, Rye and peas, Rye and tares, Algerian oats and peas, Algerian oats and tares, Canary seed and peas, Canary seed and tares.

Observations made indicate that it is advisable when arranging for mixtures of crops to confine the sowing of peas to the early-maturing cereals—Florence wheat, Skinless and Cape barley—as the peas begin to lose weight as they approach maturity.

PLATE 51.—FLORENCE WHEAT AND DUN FIELD PEAS AT T. COLEMAN'S, TOOGOOLAWAH. Yield—7 tons 14 cwt. 1 qr. 4 lb. per acre.

Tares on the other hand have a longer growing period and retain their succulence better than the field peas, consequently they are more suitable for use with Algerian oats, Canary seed, and Rye.

To those dairymen who are interested in maintaining supplies to their respective factories throughout the winter period, the following quantities are recommended for use in connection with the above class of fodders:—

Wheat 30 lb., Dun field peas or Black Tares 20 lb.
Barley 40 lb., Dun field peas or Black Tares 20 lb.
Rye 30 lb., Dun field peas or Black Tares 20 lb.
Oats 30 lb., Dun field peas or Black Tares 20 lb.
Canary seed 10 lb., Dun field peas or Black Tares 20 lb.

DRY SEASONS—A COUNTERING FIELD CAMPAIGN.

The loss of national wealth to this State brought about by periods of drought cannot be accurately estimated by figures—but their effects are undoubtedly far-reaching. If action can be taken over certain areas whereby increased production can be brought about, it naturally follows that dry periods are robbed to some extent of their devastating influences and the loss to the State as a whole is decreased. A policy of this kind is naturally educative in its character to all, but when certain sections are dealt with it becomes more particularly of value to those directly interested, and this is increased when illustrations are given for the purpose or proving the policy advocated.

For some time past the Department of Agriculture and Stock has interested itself in increased production of dairy and allied products, and with this object in view has initiated a series of fodder trials in various distrcts for the purpose of pointing out that if means are adopted for the annual provision of fodder crops for dairy stock and pig raising, the fluctuations which have in the past taken place in the supply of these products will be considerably reduced if not entirely removed.

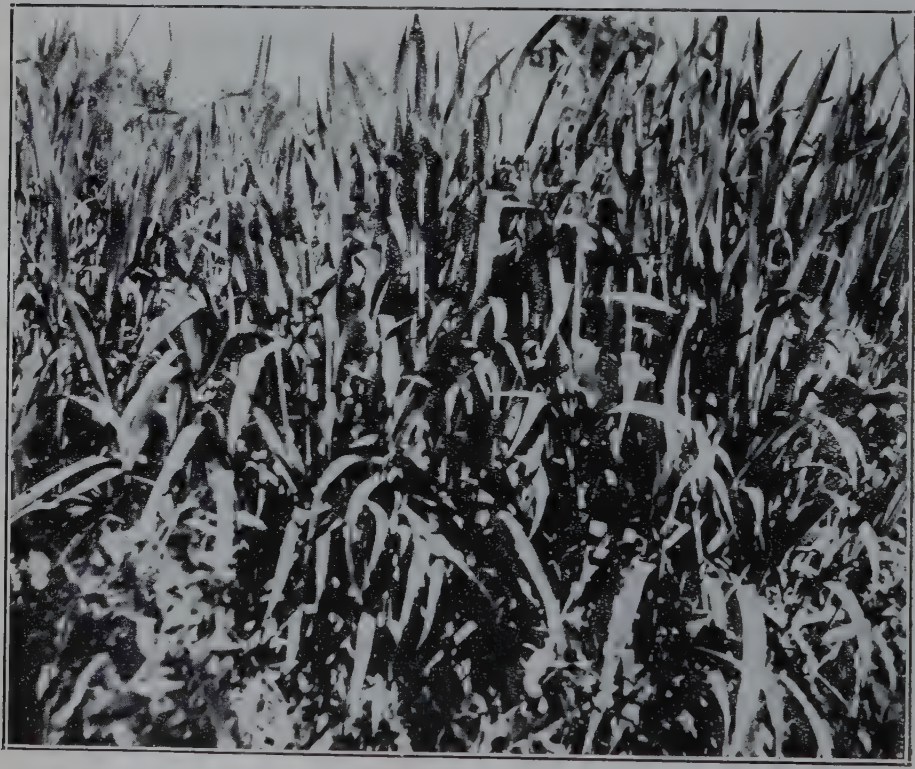

PLATE 52.—CAPE BARLEY (in shot blade stage) AND DUN FIELD PEAS AT T. COLEMAN'S, TOOGOOLAWAH.
Yield—9 tons 11 cwt. 1 qr. per acre.

Losses to dairymen and others, brought about by lessened production during dry periods, are often serious, and attention is drawn to the fact that these can be considerably reduced by adopting the policy of careful soil preparation and the sowing of crops calculated to fill the void caused by the absence or decreased supplies of natural grasses and herbage.

It was with such an object that dairy and pig fodder trials were established on the farms of Messrs. F. W. Thiedeke and Peel Caswell, of Beaudesert and Wangalpong respectively, and results obtained so far from portions of these plots

PLATE 53.—PEAS AND PILOT WHEAT AT F. W. THIEDEKE'S, BEAUDESERT (FODDER PLOTS).

Weight—10 tons 13 cwt. 2 qr. 19 lb. per acre.

PLATE 54.—PEAS AND FLORIDA WHEAT AT F. W. THIEDEKE'S, BEAUDESERT (FODDER PLOTS).

Weight—11 tons 17 cwt. 2 qr. 20 lb. per acre.

PLATE 55.—PILOT WHEAT AND PEAS AT P. CASWELL'S, WANGALPONG (FODDER PLOTS).

PLATE 56.—FLORIDA WHEAT AND VETCHES AT P. CASWELL'S, WANGALPONG (FODDER PLOTS).

have proved the soundness of the principle involved. Both farmers are capable agriculturists whose methods of cultivation leave little to be desired, and who are fully seized of the importance of fallowing and thoroughly preparing their land prior to seeding operations. The results obtained on the comparatively low rainfall experienced at Wangalpong speak for themselves; and whilst the soil at Beaudesert is of a heavier nature than that met with in parts of the Canungra Valley, the heavier rainfall experienced more than compensated for the difference in soils and their moisture-retaining qualities.

The plots were planted on the 9th and 10th June at Mr. Thiedeke's at Beaudesert, whilst those at Mr. Caswell's, at Wangalpong, were planted on the 12th and 14th of June. Rainfall experienced between the 9th June and 23rd September (the date of harvesting) at Mr. Thiedeke's being 3.66 inches, but it must be noted that a fall of 1.06 inches was experienced on 7th June, two days prior to planting. At Mr. Caswell's the rainfall received between the 12th June and 24th September totalled .91, the previous rains to that date being 1.25 inches, registered on 14th and 17th May.

The following weights of green fodder were recorded:—

	Mr. F. W. Thiedeke, Beaudesert.				Mr. P. Caswell, Wangalpong.			
	Tons.	cwt.	qr.	lb.	Tons.	cwt.	qr.	lb.
Florida wheat and peas	11	17	2	20	7	6	1	22
Florida wheat and tares	10	8	3	13	7	4	0	5
Pilot wheat and peas	10	13	2	19	8	5	2	17
Pilot wheat and tares	10	4	0	7	6	12	0	5
Skinless barley and peas	11	8	0	8	6	4	3	10
Skinless barley and tares	4	16	0	3	7	1	2	16
Cape barley and peas	6	2	1	21	4	18	1	20
Cape barley and tares	9	7	1	1	4	16	0	3
Rye and peas	5	15	0	27	4	16	1	20
Rye and tares	8	0	3	11	3	7	0	25

The varieties of wheats used in the trial were Pilot, a Bunge-Florence crossbred, and Florida, a Bobs-Florence crossbred, both of which were raised at Roma State Farm. These varieties made excellent growth, and were remarkably even throughout the trials. At the time of harvesting both varieties were in the flowering stage, averaging 3 feet 6 inches in height.

At Wangalpong both Pilot and Florida showed signs of flag-rust, but at Beaudesert no signs of rust were apparent. This was probably due to local conditions and to the fact that humidity in the Canungra Valley is greater than in the more open areas around Beaudesert.

Cape Barley.—This crop made fair growth, and when harvested was in the shot-blade stage—the height averaging 1 foot 9 inches of good healthy growth. From the general appearance of the crop a later cutting will give a heavier yield.

Skinless Barley was a clean and attractive crop, averaging 3 feet in height, which had made a remarkable growth of foliage. When harvested the grain was in the soft dough stage.

Rye.—In each case this crop made rapid growth, and was in the flowering stage when harvested, averaging 3 feet in height. Generally speaking, growth was somewhat on the thin side, and heavier quantities of this cereal should be sown when the season is somewhat advanced, as it was in this particular instance.

Field Peas in all plots made fair average growth of 1 foot 6 inches in height. When harvested they showed signs of wilting, thus reducing the weight per acre that under other conditions would have been recorded.

Vetches, usually rather slow in maturing when compared with peas, made favourable growth.

The pig fodder plots were not sufficiently far advanced in growth on 23rd September to justify their harvesting, consequently this matter was deferred till 24th November, but during this period a further rainfall of 326 points was received and recorded as follows:—25th September, 32 points; 28th September, 166 points; 16th October, 46 points; 25th October, 9 points; 16th November, 73 points; total, 326 points.

As a result increased growth was in evidence compared with that shown on the occasion of the previous visit.

As in the case with the dairy plots, Mr. Caswell had given careful attention to the cultivation of the various fodders, and an entire absence of weed growths was noticeable.

The various yields recorded can be regarded as valuable illustrations of what can be accomplished by careful and systematic cultivation of crops that are suited for purposes of economic pig feeding and can be produced at little cost to the grower.

The following are the yields recorded:—

	Per acre.			
	Tons.	cwt.	qr.	lb.
Thousand Headed kale	11	15	3	3
Dwarf Essex rape	6	9	2	16
Yellow Globe mangels	29	8	1	20
Long Red mangels	23	19	2	12
Purple Top Swede turnips	14	18	0	27
Elephant Swede turnips	12	13	3	18
Sugar beet	17	6	2	12
White Belgian carrots	12	13	3	18

The Dwarf Essex rape suffered somewhat from the attacks of Aphis, whilst the foliage of the Swede turnip was subjected to the attentions of the Rutherglen Bug; otherwise the crops were excellent in every respect.

QUEENSLAND SHOW DATES.

Following is a list of show dates for 1930, so far approved by the Queensland Chamber of Agricultural Societies:—

FEBRUARY.	
Stanthorpe	5-7
Killarney	28—1 Mar.
MARCH.	
Allora	5-6
Clifton	12-13
Tannymorel	15
Milmerran	18
Pittsworth	20
Goondiwindi	20-21
Warwick	25-28
Toowoomba	31—3 Apr.
APRIL.	
Dalby	8-9
Oakey	11
Sydney Royal	15-26
Miles	16
Chinchilla	22-23
Beaudesert	30—3 May
MAY.	
Goombungee	2
Taroom	5-7
Mundubbera	7-8
Boonah	7-8
Blackall	13-15
Roma	13-14
Gayndah	14-15
Ipswich	20-23
Wallumbilla	20-21
Springsure	21-22
Kilkivan	21-22
Biggenden	22-23
Maryborough	27-30
Toogoolawah	30-31
JUNE.	
Marburg	3
Gin Gin	5-7
Lowood	13-14
Gladstone	18-19
Mount Larcom	20-21
Rockhampton	25-28
JULY.	
Mackay	1-3
Gatton	9-10
Townsville	8-10
Rosewood	18-19
Caboolture	17-18
Nambour	23-24
Esk	25-26
Maleny	30-31
AUGUST.	
Royal National Association	11-16
Crow's Nest	27-28
SEPTEMBER.	
Beenleigh	19-20
Rocklea	27

Answers to Correspondents.

BOTANY.

The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—

Grasses and Clovers.

E.B. (Tailevu, Fiji)—

We do not know the grass you describe, it sounds a bit like Rhodes Grass (*Chloris Gayana*) which might do well in some parts of Fiji, and seed of it is procurable through any reputable seedsman either at Sydney or Brisbane.

We are not at all sure of this, and would suggest that you send a specimen seed head and leaf for identification.

In regard to grasses in North Queensland, on the coast where conditions are somewhat similar to those of Fiji, the outstanding grass from a dairying point of view is the Para Grass (*Panicum barbinode*), generally known in Queensland as *Panicum muticum* or Giant Couch. Of similar habit, but of rather finer growth, is the Kikuyu (*Pennisetum clandestinum*). Both the Para and Kikuyu are almost invariably grown from cuttings, not from seeds. A bigger grass that could be used for combined grazing and cutting you might try Soudan (*Sorghum soudanense*) and Elephant Grass (*Pennisetum purpureum*). Seeds of both of these are procurable, of course, from any reputable seedsman in either Sydney or Brisbane. We do not think you will have any success at all with clovers in Fiji, as these are essentially temperate plants. The only clover that does any good at all in Queensland is the ordinary White Dutch, *Trifolium repens*. Lucerne should do quite well on arable land. Allied to the clovers are the Medick Burrs or Burr Trefoils, Medicago species, or which the commonest is *Medicago denticulata*, very common in Queensland and New South Wales, though we do not know whether seed is stocked by nurserymen. These plants are not of annual duration, but come up with the winter rains, and provide feed during winter and spring when other grasses and herbage are more or less absent or at a stand still.

A plant that has overrun a good deal of North Queensland of recent years is *Stylosanthes mucronata*, known as Wild Lucerne. Like Burr Trefoil it is of annual growth, but is a summer not a winter feed. It provides excellent forage comparable to lucerne in nutritive value. I do not think seed is stocked by seedsmen in the ordinary way, but if you wrote to the Instructor in Agriculture, at Townsville, N.Q., he might be able to put you in touch with a supply. This officer (Mr. N. A. R. Pollock) should be able to give you some useful information about fodders for your part of the world, as conditions in his district are comparable to those in Fiji.

Grass for Golf Links.

INQUIRER—

The best all-round grass for golf links near Bowen would be the Common Couch (*Cynodon dactylon*). The Blue Couch (*Panicum didactylum*) should also do well in the locality. A grass that lies flat on the ground in North Queensland and makes a fairly close turf is the broad-leaved form of *Paspalum platycaule*. This does particular well near the sea. We do not know that seeds are obtainable, but the plant is easily propagated by roots.

PIG RAISING.

(Selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.)

Paralysis in Pigs.

A.E.C. (Inglewood)—

Tell us more about the symptoms of the trouble, and describe your methods of handling and feeding your pigs. Bush ticks are often the cause of paralysis in young pigs. Ordinary hog lice do not actually poison the pig, but their continual irritation results in loss of rest and in reduced condition.

Seaweed as Fertiliser.

H.A.P. (Karragarra Island)—The Agricultural Chemist, Mr. J. C. Brünnich, advises as follows:—

The composition of seaweed varies very considerably. Roughly speaking, the seaweed has about the same value as a good stable compost, and it would be always best to collect it in stacks and allow it to rot. Mr. Brünnich's analysis of your sample:—

	Per cent.
Moisture and organic matter .. .. =	76.0
Salt (NaCl) .. .. =	4.7
Lime estimated as CaO .. .. =	5.8
Nitrogen .. .. =	1.2
Phosphoric acid as P_2O_5 .. .. =	0.2
Potash as K_2O .. .. =	0.8

This material has some manurial value and would be worth collecting, but could not stand much transport costs. It would unquestionably be much more valuable if allowed to rot and consolidate made into a compost heap.

Pollen Substitutes

R.W. (Gympie)—The Agricultural Chemist, Mr. J. C. Brünnich, advises as follows:—

Freshly prepared maize meal is undoubtedly superior to commercial maize meal as a pollen substitute, and it is unquestionably the finely ground germ which is the most valuable part. The germ is really a part of the ovum and the composition of this and pollen closely related. A good quality of pollen contains about 5 per cent. water, 30 per cent. proteins, 5 per cent. starch, 15 per cent. sugars, 40 per cent. other carbohydrates, fats, wax, ash, &c., and is naturally rich in vitamines, which are present only in very minute amounts, but which are the most indispensible and most difficult to replace. Bees when starving for pollen, use all kinds of substitutes, and their instinct does not show which are the best, they have been known to collect sawdust, coal dust, soil, &c. When giving substitutes like flour, of which rye flour appears to be the best, and other meals, it will be difficult to ascertain with absolute certainty which is the best, unless all other sources of real pollen are excluded. Milk has been found valuable, but decomposes too quickly, but I think it very probable that milk powder, like "true food" mixed in small amounts with flour or pollard would be found valuable. An ideal food would be the yolk of an egg, if it could be mixed with flour, dried and ground up again. Any strong heating must be avoided as it is likely to destroy vitamines. I have no hope in fungus spores, smut, &c., being ever utilised, and in many cases would be dangerous, as spores are frequently poisonous.

TWO MILLION TREES.

Two million young rubber trees are now being planted in the Dunlop Plantations, Malaya, section by section as the heavy tropical jungle is cleared and its soil prepared over an area of 16 square miles.

In ten years' time it is expected that the new trees will yield an annual crop of 5,000 tons of rubber. At present 8,500 tons of rubber a year is being tapped from 4,000,000 trees.

Every other day a very thin strip of bark is cut from each tree and the fluid rubber drips into the cup below. As each cup receives, on the average, only half an ounce of dry rubber daily, between 600,000,000 and 700,000,000 cupfuls of it have to be collected in the course of twelve months.

One third of the native workers are Chinamen, but the bulk of them are Tamil specially recruited from the south of India. Temples for their worship are built by the Dunlop organisation, which also provides houses and hospitals for them, schools for their children, and rice at cost price.

Golf courses have been laid down for the European staff, whose Rugby team is making a bid for the championship of Malaya.

Early next year the dense jungle is to be tackled over a further 16 miles on the Dunlop territory, which is more than 125 miles in extent.

General Notes.

Staff Changes and Appointments.

Mr. P. L. Barry has been reappointed Government Representative on the Tambo Dingo Board.

Mr. M. Maloney, of Meandarra, has been appointed an Acting Inspector of Stock at Meandarra.

Mr. C. H. S. Wills, of Aramac, has been appointed Government Representative on the Aramac Dingo Board.

The appointment of Mr. O. H. Webb as Acting Inspector of Stock has been cancelled as from 31st December, 1929.

Mr. Charles Bradbury has been appointed an Officer under the Animals and Birds Acts, as from 28th December, 1929.

The appointment of Mr. J. J. Shelvey, as Inspector of Stock at Crow's Nest, has been confirmed as from 6th June, 1929.

Messrs. C. N. Morgan, W. G. Hancock, and A. J. Browne have been appointed Temporary Inspectors under the Diseases in Plants Act.

Mr. R. J. T. Kidd, Inspector of Stock, Normanton, has been reappointed Government Representative on the Carpentaria Dingo Board.

The appointment of the Officer in Charge of Police at Sapphire as an Acting Inspector of Stock has been cancelled as from 31st January, 1930.

The appointment of Mr. J. L. Hodge as Instructor in Sheep and Wool, Department of Agriculture and Stock, has been confirmed as from 4th June, 1929.

The appointments of Messrs. W. J. Sheahan and E. C. Dunn as Inspectors under the Diseases in Stock Act have been confirmed as from 6th June, 1929, and 4th June, 1929, respectively.

Mr. F. C. Shaw, of Maryborough, has been appointed a Temporary Inspector of Slaughter-houses from 2nd January to 4th February, 1930, during the absence of Mr. E. C. Todd, on leave.

Messrs. V. A. Spyve and J. D. Ferricks, Police Constables, have been appointed Inspectors under the Slaughtering Act as from 13th December, 1929, and 26th December, 1929, respectively.

Messrs. T. I. Parker and William Law, of Goodna, and Mr. H. M. Johnstone, of Ashgrove, have been appointed Honorary Rangers under the Animals and Birds Acts, as from the 14th December, 1929.

Acting Sergeant T. Smith, of Surat, has been appointed an Inspector under the Brands Act; Constable R. J. Nesbit, of Kalbar, has been appointed a Slaughtering Inspector; and the Officer in Charge of Police at Atherton has been appointed an Acting Inspector of Stock.

Mr. J. H. Buzacott has been appointed Assistant Entomologist, Bureau of Sugar Experiment Stations, Department of Agriculture and Stock, as from 1st January, 1930; and Mr. N. G. Cassidy has been appointed Research Assistant, Bureau of Sugar Experiment Stations.

Mr. W. D. Cameron has been reappointed Government Representative on the St. George Dingo Board; Mr. R. C. Lethbridge has been reappointed Government Representative on the Booringa Dingo Board; the Police Magistrate, Ingham, has been reappointed Government Representative on the Kennedy Dingo Board; Mr. T. Law has been reappointed Government Representative on the Adavale Dingo Board; and the Inspector of Stock at Charleville has been reappointed Government Representative on the Warrego Dingo Board.

Pineapple Levy, Term Extended.

Regulations providing for a levy to be made on all pineapples marketed in Queensland were passed on 14th January, 1926, and extended until 24th January, 1930, on 15th March, 1929. The levy is made by the Committee of Direction of Fruit Marketing, and is at the rate of ½d. per case, or, in the case of being sold loose, at ½d. per forty-two rough or ripley pineapples, or at the rate of ½d. for every twenty-four smooth pineapples. A regulation has now been passed extending the levy to include all pineapples marketed in Queensland until 24th January, 1931.

A Laidley Sanctuary.

An Order in Council has been passed declaring Reserve R. 132, known as Dyer's Swamp, Laidley, as a Sanctuary under the Animals and Birds Acts; thus it will be unlawful for any person to take or kill any animals or birds in this area.

Egg Board Election.

Nominations will be received by the Returning Officer, Department of Agriculture and Stock, Brisbane, until 20th February, 1930, for election for one year as from 1st April, 1930, as growers' representatives on the Egg Board. Five such representatives are to be elected, and each nomination is to be signed by at least ten growers of eggs who own fifty fowls or more.

Atherton Tableland Maize Board.

Nominations will be received by the Returning Officer, Department of Agriculture and Stock, Brisbane, until 5 p.m. on 17th February, 1930, for election as growers' representatives on the Atherton Tableland Maize Board. Five such representatives are to be elected by growers who, subsequent to 24th March, 1929, grew for grain within the Petty Sessions District of Atherton, Herberton, or Chillagoe, at least 1 acre of maize and delivered the product of same or part of same to the Board for sale. Each nomination is to be signed by at least ten growers as above.

Canary Seed Board.

The definition of "Growers of Canary Seed," as stated in the Order in Council dated 23rd December, 1927, constituting the Canary Seed Board, in paragraph 4, has been amended. The definition now reads as follows:—

> "(4.) The class of persons who shall be deemed to be growers of such commodity and eligible to vote at any referendum or election in connection with the said Board shall be persons who have grown or have growing canary seed for sale within a period of twenty-four months prior to any election or referendum held in connection with the said Board."

Over-Production of Milk.

Better attention to breeding had raised the average annual milk yield of all recorded from 599 gallons in 1917-18 to 673 gallons in 1927-28. So said Mr. J. F. Blackshaw, of the Ministry of Agriculture, before the Auctioneers' and Estate Agents' Institute (England). Dairy farming had in a comparatively few years grown from a localised industry to one which now represented more than 30 per cent. of the whole farming industry. There was some reason to think that unless the public could be induced to drink more milk, or unless more satisfactory provision were made for the manufacture of milk into products, the milk industry might, in the near future, suffer from over-production.

Another Thrice 2,000 Galloner.

Major C. F. Case's wonderful British Friesian cow Blickling Mist has added to her fame by completing her third 2,000-gallon yield.

Blickling Mist was bred by Mr. Thomas H. Case, but her working life has all been spent in the herd of Major C. F. Case, of Cockthorp, Wells, Norfolk. Born on 6th September, 1923, she has calved four times and milked as follows:—

14.551 lb. in 337 days in milk, 1926; 20,130 lb. in 310 days, 1927; 21,754½ lb. in 342 days, 1928; 20,527½ lb. in 248 days, 1929; total, 76,963 lb.

Blickling Mist has thus produced, with her first four calves, and in a total period of less than four years, 7,696 gallons of milk. Moreover, she has set up a new British record for production at six years old, her total output at such age being 7,325 gallons, an achievement which displaces Mr. James Calwell's wonderful Irish Friesian cow Ballyhill Brineen, who at the age of six had given 6,837 gallons.

Blickling Mist was reserve champion in the Open Milking Trials at the Royal Show at Harrogate in July last, on which occasion she gave 78 lb. of 3.37 per cent. milk, from which 2 lb. 12¼ oz. of butter were made. She also came second in the Open Butter Tests at Harrogate, and second in the last of the "Harold Jackson Trophy" competitions, her average annual yield for three successive years being 1,805.7 gallons, just insufficient to beat an eight-year-old cow that averaged 1,806.4 points over the same period.

Both the sire and the dam of Blickling Mist carry the blood of the bull Beccles Lodewijk, that sired no fewer than ten 2,000-gallon cows.—"Live Stock Journal" (England).

Banana Levy, Term Extended.

Regulations making provision for a levy on bananas were passed on 1st September, 1927. Such levy is payable by growers of bananas marketed in Queensland, and the rate of the levy is fixed at 1d. for every £2 or part thereof of the net proceeds realised from sales. The levy, which is made by the Committee of Direction of Fruit Marketing, operated until 31st December, 1929. A regulation has now been passed to include all bananas marketed until 31st December, 1930.

Rating of Agricultural Land.

The following interesting opinion is given by "Local Government," the organ of the Local Authorities Association of Queensland:—

Case.

I am instructed to write and inquire if an owner of agricultural land in the town area is entitled to differential rating? If so, must the land be used for agricultural purposes?

Opinion.

In my opinion the owner of the agricultural land referred to is not entitled to be rated at a lower rate than the general rate as of right, but if the local authority is of the opinion that the land is not in demand for building sites or residential areas and is being reasonably used for the purpose of primary production it may levy a lesser rate. (*See* section 233, as amended by the Act of 1923.)

Small Goods Sales—Amended Regulations.

An amendment has been passed to Regulation 49, under the Diseases in Stock Act, which provides that any small goods may be stored or sold in the same room as is used by the owner or occupier of a butcher's shop for the storage or sale of meat. The regulation now provides that small goods may be stored or sold by any person who does not sell or offer for sale fresh beef, except veal from carcasses of not less than 40 lb. or more than 80 lb. dressed weight, or mutton of any description.

The effect of this will be that small goods shops will be restricted to the sale of the following articles:—Bacon, brawn, brains, bread, butter, cheese, cooked meats, dripping, eggs, fish (smoked or cured), ham, kidneys, lard, mince, pies, pork, poultry (dressed), rabbits (dressed), sausages, scones, tinned and bottled foods, tongues, tripe, trotters, veal from carcasses of not less than 40 lb. or more than 80 lb. dressed weight.

Feeding of Dairy Cows.

Improper feeding of dairy cows is one of the chief causes of unprofitable dairying.

It is not contended that the heavy loss to the dairying industry brought about by insufficient feed during an adverse season could be wholly avoided by up-to-date methods of feeding, observes a recently issued pamphlet of the Department of Agriculture, but it can safely be stated that by the practice of proper methods of farming the dairyman would be in a much better position to face a period when providence does not treat him too kindly. Top-dressing of pasture land, conservation of surplus fodder, and the utilisation of farm-grown fodder crops in such a manner as to ensure their maximum feed value are practices which must be employed in order to obtain the best results. Most farm crops, with the addition of a small amount of concentrates, form excellent balanced rations, and by feeding the various fodders in this way their full nutritive value will be utilised by the animal and waste in feeding will be eliminated. Waste by improper feeding of farm crops is very commonly observed on dairy farms, whereas if these crops were utilised in the correct manner better results would be obtained from the herds at very little extra cost.

Hand-feeding of dairy cows is, comparatively speaking, not carried out very extensively in this country, and in many instances where the practice is being adopted the rations fed are prepared in such a manner, and with so vague a knowledge of the correct method of preparing a true balanced ration, that waste in feeding is the result. The cutting of valuable fodder crops and throwing them in the paddocks for the cattle to eat is still a general practice with many farmers. This method is not only wasteful, from the point of view of utilising the full nutritive value of the fodders, but is objectionable from another standpoint. Dairymen have no doubt noticed that by adopting this method of feeding their cows the herd is continually being disturbed by the strong robust animals with a keen appetite, who endeavour to obtain more than their share of the feed, with the result that the younger and weaker animals in the herd are deprived of their nourishment.

The A.I.F.

It is not generally known that the place of birth of members of the A.I.F. who sailed from Australia for the Great War was as follows:—Queensland, 28,253; New South Wales, 88,250; Victoria, 92,553; South Australia, 27,761; West Australia, 8,042; Tasmania, 13,104; United Kingdom, 64,221; New Zealand, 4,214; other British countries, 2,246; foreign countries, 3,437: total, 331,781. It will be seen from this summary that 77 per cent. of the men of the A.I.F. who left Australia for the front were native-born. The percentage of casualties to Australians engaged was 69½ per cent.

The Anti-Waster.

He is obsessed with the tremendous waste that goes on all around him. He declares that enough good, nutritious food is flung into the rubbish bins in Brisbane every day to feed all the unemployed in the State. ''We are a recklessly wasteful people,'' he says. ''Look at that high-powered car, slipping by there, with only the flapper driver. The power that could easily pull a ton is wasted in carrying a six-stone flapper. How much land could that extra power, if usefully employed, plough up in a day? A big able-bodied man served me with a necktie this morning, and I saw a little sickly fellow down on the wharf tugging at an outsize truck. No organisation of mechanical or human forces anywhere! The whole universe seems to be run on the same wasteful lines. Have you ever considered the enormous amount of solar energy released by the sun every day, and how infinitesimal a portion of it is absorbed by the planets—the rest wasted in space? And yet they talk about the conservation of energy!''—''The Professional Officer.''

The Moral Code of "Woodbine Willie."

The Dean of Canterbury (''Dick'' Sheppard), writing of his friendship with ''Woodbine Willie'' (the Rev. G. A. Studdert-Kennedy), says:—

''There has never been anyone in my life who at all resembled him. To me the outstanding qualities which made his friendship so lovely were his deep love of humanity, his intense sympathy and generosity, and his magnetic humour and wit.''

In a letter that ''Woodbine Willie'' sent to his wife while serving in France as to the training of his little son, it is written:—

''1. Make him a sportsman. Encourage him to play games and always to play the game.

''2. Teach him to despise cowardice and never to be afraid of anything or anyone save God.

''3. Teach him as soon as you can what his body is for, about his powers of procreation, and about the necessity of cleanliness in body and mind.

''4. Teach him to tell you everything about himself, and specially everything of that sort.

''5. Teach him that being a gentleman means using your life to serve and help your fellow men as much as ever you can, and that it is dishonourable to desire only to make money and be comfortable. If he has brains, teach him that he must use them to lead men on to better things, and to teach them a gentleman should choose one of the poorly paid but honourable professions.

''6. Teach him to love and reverence women. Encourage him when young to have plenty of girl friends, and to treat them as comrades and never to play with them and deceive them. Teach him that the man who deceives a woman is a scoundrel and that he must try to live straight.

''7. Last, and most important, about his religion. Teach him to love Jesus Christ as the pattern God-Man. Teach him that and leave him free. Don't force his religion in any way, especially if he has brains. There are bound to be in these coming years very rapid developments in Christian thought; let him go his way, and do not be pained or shocked so long as he keeps his love to Jesus Christ. If he wants to become a priest, let him, but never force him in any way. Only teach him constantly that a gentleman must give, not get, must serve and not be served.

''Guard him from vulgarity and snobbishness, and never let him speak contemptuously of anyone or anything except a coward.

''I think that is all. Kiss him for me and give him my blessing, and when he is old enough tell him my life story as you would tell it, knowing that I tried hard most of the time to do right, and when I sinned I was sorry in my heart, as I am now.

''I don't believe I am going to be killed, but I don't know, and any way I am content, so long as God can comfort you.''

Dreams and Realities.

"The only real things in life are the dreams," declared Mr. C. G. Ammon, M.P., Financial Secretary to the Admiralty, in a recent speech. "The men and women who make history are the dreamers. There was hardly anything they enjoyed in their social or everyday lives that had not first of all been seen by the dreamer, who then had to make the practical man realise there was money in the idea. As long as a nation or people keep their eyes on purely practical things, that nation is doomed to certain extinction, whether it be immediate or somewhat delayed."

Can Any of Our Readers Beat This?

Discussing pig matters recently with Mr. Walter Skinner, of Jandowae East, via Jandowae, Queensland, we ascertained that his returns from bacon pigs sold during 1929 equalled £3 per cow; that is to say, the dairy herd in regular use numbered 100 head and the returns from the pigs for the year were £300—equal to £3 per cow—the bulk of the pig food being skim milk plus farm-grown crops, greenstuff, &c. We have not the figures per cow or per pig but just a bare outline of the results, and it would be of interest to hear whether any of our readers have kept records of their returns from pigs. Mr. Skinner keeps four or five sows and a boar and occasionally purchases odd lines of store pigs at times when his own stock is depleted by sales or otherwise, and he is quite satisfied there is good money in pigs if they are handled along correct lines.

To Reduce Costs in Tractor Farming.

Looking back over the past ten years, one must marvel at the tremendous advances made in mechanical transportation. Almost daily we are being thrilled by the spectacular feats of speed and endurance on land and sea and in the air. One wonders where it all will end, and how soon the day will come when the uttermost speed has been attained and machines reach such a stage of perfection that the poor human being, with his many limitations, cannot control them.

There is one unit of transport, however, about which we hear very little. It is not heralded for its feats of speed; neither do we read at length of prolonged endurance tests in which it is featured, but, nevertheless, this machine is wonderful in what it can endure, and remarkable in the speed at which it accomplishes large quantities of everyday work. We are referring to "the Tractor." There is no doubt that during the past few years tremendous strides have been made in the perfection of the modern tractor. Time was when a tractor was a large piece of intricate machinery, cumbersome to handle and expensive to run; to-day, however, it is a machine of remarkable economy and efficiency, and there is no doubt that it is an absolute boon to the farmer. Tractor manufacturers have been constantly improving, with a view to obtaining more and more work at less cost. Weight has been reduced, traction has been wonderfully improved, compressions have been made higher, and every facility for ease of working has been adopted. The result is a machine which takes the place of a team of horses, and does the work quicker, cleaner and cheaper, and can, if need be, work twenty-four hours a day for seven days in the week.

With the increased efficiency of the tractor motor must naturally come increased efficiency in the fuel with which to run it. The farmer to-day is demanding the highest quality kerosene in order that he may enjoy, not only the greatest economy, but the greatest ease of working from his tractor. In the old days, when a tractor was only used for the heavy work of the farm, practically any sort of kerosene "would do"; to-day, however, the tractor is a utility job, and its operations range from the full-power job of pulling a plough through clayey land to the lightest job of cutting chaff. The result is the need of a kerosene which will accomplish both jobs and all those in between with ease, and the farmer is fortunate in having supplies of the "New Cross" kerosene within easy reach at over 500 Shell Company depots throughout Australia. This kerosene is a fuel which not only excels in power and economy, but which can be thoroughly depended on to give excellent idling and starting results under the worst possible weather conditions. To the farmer who is sowing or doing light work, where frequent stops are necessary, this facility of idling is essential, and it is with this important point in view that the "New Cross" was evolved.

Another big advantage of this new fuel is the very small percentage of crankcase dilution which occurs. In the past, the dilution of the crankcase oil by unburnt kerosene fractions has been a cause of constant worry and expense to the tractor owner: this is now practically eliminated.

Dipping Deeper.

"There is nothing like a sip of somebody else's philosophy. The biography of some great man or woman, or a collection of letters or memoirs—are so scandalous—gives just the right incentive to go and do likewise when the holidays are done. 'Contact with great minds,' it is familiarly called, and it has in truth as bracing an effect as a draught of fresh air. It also serves to counteract the false ideas that the novel may have set agoing. Here is something milled from hard experience, not the wild dreams of a romantic. Something rather hard to bite on may prove more welcome than you think on a wet day. Everyone hates the wasted feeling that a wet day in the country brings. Novels only make it the more irksome, and belles lettres are apt to seem a little futile, too. The wet day is often the day for something practical. A book, then, on political economy, bird lore, or ancient history—the subject matters less than its serious treatment—may prove a godsend." —E. F. Osborn, in the "Morning Post."

When Digging Post Holes.

Post holes should be from 22 inches to 24 inches in depth. They should not be made too big, as this involves unnecessary labour both in digging, filling, and ramming; nor will the post have such a firm grip in the ground. The holes should be a little more than large enough to receive the posts comfortably and leave room for the rammer to work to the bottom of the hole.

Dig the full depth straight away; if a little too deep it is easy to put in some loose earth to make the post the right height. Sight the posts from the centre, and fill in and ram the bottom—say, the the first 6 inches—thoroughly. The bottom, and near it, is the place where ramming is most required; as the top is approached less ramming will do. Place earth that remains neatly around the post to allow for subsidence.

Sink post holes, if possible, when the ground is in good condition—not too wet and not too dry. Ground saturated with moisture cannot be well rammed.

Fruit Experiments.

In the heart of Kent, near East Malling, experiments are about to be carried out to improve the transport facilities for fruit, particularly on such long-distance routes as the North Pacific and Australia. A complete model of a ship's hold is being erected by the Cambridge Low Temperature Research Station, which is working in conjunction with the Empire Marketing Board. Although the fruit imports of Great Britain have improved wonderfully lately, and show no signs of decreasing, it is felt that there is far too much wastage in transport, and for some time past big efforts have been made to find improved methods. Most of these have been in the laboratory, where very useful work has been carried out, and a good many valuable discoveries made, but it is now felt that it is high time to try them on a bigger scale, and that it is far cheaper to carry out the work on shore than to fit out the hold of a ship. That can come later, and in the meantime the building at Malling will hold about a hundred tons of fruit. On land, such alterations as may be found to be necessary in the progress of the experiment can be carried out without delay and expense, the installation being sent afloat for a thorough practical trial when something like finality is reached ashore.

Essentials to Happiness.

If you were asked to make a list of the six things you need most for happiness, what would you put down?

Why not make your own list before reading any further? Like every other person in the world, you want to be happy, and doubtless have given more or less thought to the matter.

Dr. William S. Sadler has studied people for twenty years or more, and he says he has found the essentials of a normal happy life to consist pretty much of the following six things:—1, good health; 2, congenial work; 3, discipline or self-control; 4, human companionship; 5, reasonable leisure; 6, religious or spiritual philosophy.

You will notice that he doesn't lay special emphasis on money at all, although some people would place it first. His experience tells him that many people get along happily without any great amount of material wealth. But there are far too many on the poverty line.

People who enjoy good health and who are doing work they love to do in the right way have found heaven for themselves right here on earth.

Equalise the Car Load.

Equal loading is something that is often disregarded with the small light car especially the four or five seater. When there are three persons in the car, the disposition of the third, supposing the first two are side by side, is important. The driver, naturally, occupies the right side of the front seat. The other passengers, therefore, should be so placed that the greater weight is on the off-side of the car. Thus, a third passenger, if in the back, should sit on the right side. Similarly, with four passengers, the heaviest should be on the off-side.

The camber of the road already draws the car down unduly on the rear springs. This propensity is emphasised and increased if the heavy passenger be seated on the near side. The car is difficult to steer out of the left side of the road and on corners difficulty may be experienced in getting around without much reduction in speed.

Sometimes the heavier load on the near side makes for actual danger. It increases the chance of skidding when the surface is greasy and it prevents recovery. Equal loading should be obtained if possible, and to ensure equal loading on cambered roads, it is desirable to have the greater weight on the off-side of the vehicle, as so much of the driving is on the unlevel left side of the road.

Wheel—Wobble.

One of the most disconcerting faults that can develop in a motor-car is wheel-wobble, a defect usually caused by the vibrations of the road accidentally putting the two front springs in step with their own vibrations. When that occurs, there is an up-and-down see-sawing movement that produces wobble or shimmy, as it is sometimes termed.

Consequently shimmy dampers are sold, which are a kind of shock-absorber, linking either two portions of the steering mechanism, or the steering tie-rod and the front axle.

Some manufacturers have cured this fault of wheel-wobble by shackling their front springs in front, instead of anchoring them on the dumb-irons, so that it is doubtful whether those springs and the steering-rods will set up the same regularity in their vibrations. As a matter of fact, high speed wheel-wobble is very difficult to remedy, as the devices referred to really apply to ordinary low-speed shimmy. Owners of racing cars very often have to take special means to prevent wheel-wobble by putting in a stronger spring on the off-side than that on the near, or else provide entirely independent springing.

The firm of Rolls-Royce for years realised that every axle was prone to develop wheel-wobble, even on the back axle, and always carried an extra leaf or a stiffer spring on the off-side of the chassis, to counteract any possible shimmying effect that might develop with springs of the same flexibility.

Profitable Breeding Sows.

Mr. B. Henwood, of Besters, in South Africa, writing in the ''Farmers' Advocate,'' mentions that one of his pedigreed Large White sows had a litter of twenty-one recently—all alive and healthy. She has now had three litters and is only two years and five months old. Her first litter was one of ten, and she reared them all, her second of fourteen and she reared eleven, and now twenty-one, which makes an average of fifteen per litter. Is this a record, especially taking into consideration her age? She is a big and well-grown sow, and does her litters well. Ever since starting with pigs, I have always bred only from pigs which came from big litters and whose sires were from big litters. If more breeders of pigs, whether pure or crossbreds for bacon, paid more attention to size of litters of their breeding stock pig-breeding would pay better than it does. Mr. Shelton, Senior Instructor in Pig Raising, has given us these other records of large litters:—(1) A Chester White sow farrowed ninety-six pigs in six litters. The last three litters she farrowed eighteen pigs per litter. (2) Twenty-one pigs per litter—breed of sow unknown. (3) Twenty-three pigs per litter—breed of sow unknown. This last sow gave birth to five litters with a total of eight-five pigs. (4) Twenty-five per litter by a Poland-China sow. (5) Mr. D. E. Hollis, Hollisdale, N.S.W., reared a sow (Tamworth-Berkshire Cross) which had six litters, totalling 105 pigs. She farrowed nineteen pigs on the 28th August, 1928. Three of the pigs went to 140 lb. and the litter averaged 130 lb. Then on the 7th January, 1929, this sow farrowed twenty-six pigs, all alive.

Get to Know Your Cows.

A very great advantage derived from keeping milk records, especially if it is done by someone directly interested in the welfare and profit of the herd, is this: Cows are particularly sensitive animals, and the yield of milk is influenced to a great extent by the treatment they receive, both as regards feeding and their general management; therefore anyone who keeps the record has a great opportunity of discovering the cause from which a certain cow fails in her yield of milk, and he is in a position to put the matter right before any harm is done.

The causes of cows falling off in their milk without any apparent reason are many. For instance, a timid cow may be tied up next to a masterful one, or a new man or lad may be employed who is an indifferent milker, or a cow of a nervous temperament may be receiving such rough treatment as will quite account for her milk falling off.

Again, it may be that the food does not suit some individual cow, and this can be remedied by a slight alteration. Each or all of these reasons can be detected very soon by one having to be in the cowshed in order to keep the records, and which possibly might not otherwise be discovered so quickly, if at all, and anyone doing this would find themselves amply repaid at the end of the year.—S.R., in the "Live Stock Journal" (England).

Milling Values of Wheat.

There are various factors which lower the value of wheat from a milling aspect. Among them are the presence of smut, damaged grains, damaged patches, and bleached, sprung, and shot wheat.

Smut.—The fungus disease known as smut, or bunt, has a very serious residual effect on wheat from a milling point of view. Smutty wheat is treated harshly by millers, as it is difficult to handle, and, although certain "smutting" machines will make a fair sample of infected grain, it is at a considerable cost. There is no excuse now for smutty wheat, however, as practically complete control is secured by proper treatment of the seed. The most satisfactory is the dry copper carbonate process.

Damaged Grains.—The presence of these in a sample of wheat reduces the milling value very considerably; they have serious effects on the quality of the flour, causing a bad colour, imparting an objectionable taint, and reducing its keeping qualities. Furthermore, these damaged grains cannot be removed.

The most serious are those that have been heat damaged, but fortunately they are not common under Australian bagged conditions. They are mostly caused by harvesting the wheat while it is unripe, but the majority of growers are sufficiently alive to the necessity of harvesting when the grain is matured, thus largely obviating the danger of this objectionable condition. This trouble is frequently caused by standing bags of wheat in the paddock without placing sufficient logs (and in some cases none at all) for a foundation. If the ground is damp, or if rain should fall the bottoms of the bags become wet and the wheat is spoilt.

Damaged Patches.—These are viewed seriously, and to remove them it frequently occurs that a section of the bag is cut away with the bad grain adhering. This causes the bag to be valueless and is productive of much waste of grain, and is a source of considerable expense, whereas a little care would have saved to the grower the full original value of the wheat.

Bleached, Sprung, and Shot Wheat.—These defects are all caused by excessive external moisture conditions when the grain is just ripening or ripe, and they might be described as three stages of the one complaint—each causing a reduction in value according to the severity of the damage. Such weathering is difficult to control, being largely dependent on climatic conditions. An alleviation may be secured by close attention to the sowing of suitable varieties at the right time, by harvesting as expeditiously as possible when the grain is ready, and by sowing fine type varieties free from grain of a different maturing period, so that all ripens at the one time.

Bleached wheat is recognised by its loss of colour, for it has a pale, anæmic, and lifeless appearance, with an attendant considerable loss in weight.

Sprung wheat is distinguishable by the above symptoms, together with a bloated appearance of the germ, whilst shot wheat is similar, but with the germs sprouted. Each of the three defects is disliked by millers, the wheat being difficult to store for any length of time, and the flour being much reduced in strength.

Breeding Sows—Size of the Litter.

The size of the litter produced by each sow is determined by several factors—heredity, breed, nutrition, physical condition, frequency of breeding, age of sow, and season of the year. Although the mode of inheritance or the ability to produce large litters is not definitely understood, there is little doubt but that the majority of factors governing the number of ova released and developed in vigorous sows are hereditary. Sows bred twice a year do not produce as many pigs per litter as those bred only once, unless they receive special care; but in herds where the physical condition of the sows is kept at a very high level, these differences do not exist. It is sometimes noticed that young sows do not have as many pigs as older sows. Heavy, fat sows do not have as many pigs as sows in moderate condition; neither do very thin, ill-nourished sows.

There is a very close relation between the size of the litter and the normal weight of the pig at birth. If the litter is five or less, individual pigs weigh as much as 3 lb. or better apiece; if it consists of six to eight pigs, the average is usually 2 lb. to 2½ lb.; if the litter consists of ten or more, the average weight is not likely to exceed 1½ lb. to 1¾ lb. per pig.

Clutch Carelessness.

Clutch carelessness probably causes more wear on cars than any other one thing. A clutch let in with sudden force will make the driving wheels turn a little on their tapering axle ends. Looseness at this point actually becomes a safeguard; otherwise pinion and ring gear would have to endure excessive strain.

Universal joints are strained by sudden application of power, especially if they are worn to a point where they are loose.

Sudden acceleration is more apt to strain the clutch and the rest of the drive, although it also frequently loosens the rear wheels from the axles, injures the universal joints, strains the spokes of the wheels, and increases tyre wear.

Clutches are designed for easy operation, and if the engine be speeded beyond the point where the car itself can immediately follow, the clutch plates will slip. This causes them to heat and may permanently damage them. Often when the clutch slips it will heat and expand, resulting in sudden gripping that is damaging to the whole drive mechanism.

The Speedometer—Its Accuracy Affected by Tyre Wear.

The accuracy of motor speedometers is now practically taken for granted, but if actual scientific tests were made it is possible that their recordings would be approximate only. In most instances, however, the speedometer is so nearly accurate that it is of immense value for all ordinary purposes. On the other hand, speedometers may become inaccurate, and generally they err, after long use, on the side of increasing speed reading.

Again, tyre wear will affect the reading. Given a tyre with, at first, a good thick tread, which has worn down considerably, the reading will be rather excessive. If the tread wears half an inch in diameter the car will travel approximately one and a-half inches less for each rotation of the wheel. This will increase the speedometer reading by a small amount. If the owner is in doubt about the accuracy of his speedometer he can easily check it between mile posts. If it is much out, he should have it overhauled and reset. Wear of tyres will affect the mileage register to the same degree as the speed reading.

Kicking the Bucket—Treatment of Nervous Cows.

Beating a cow with a milking stool when she kicks or switches her tail at milking time is sometimes "adding insult to injury," observes the veterinary export of "Hoard's Dairyman." Who is to blame for her fear of the milking act, for it is that which incites rebellion or reflex acts indicative of nervousness It is more the milker than the cow. Considering the exceeding tenderness and sensitiveness of the teats at the first time of "freshening" and the strength and hardness of the hands of the son of toil who does the milk extracting, is it to be wondered at that pain is induced by the act, and that it is never forgotten by the animals? There is a certain number of cows allotted to each milker, and if he doesn't get them stripped in a given length of time he is accounted inefficient. The consequence is that he gets into the habit of hurried, willy-nilly, "come on with your milk" manipulation of the teats of each animal, heifer and adult cow alike, very different from the process followed by the calf in sucking milk. The teats are squeezed, bruised, pulled and stripped by the man, all of which cause excruciating pain, at first; but after a time the skin of the teats becomes calloused, more or less, and suffering abates or subsides. But the memory of it remains, and is expressed by kicking, stepping back and forth, setting a foot in the pail, switching viciously, or "holding up" the milk.

It would be a blessing to every heifer could she be "broken to milk" by a woman—gentle, motherly, sympathetic woman. The work certainly should, in every instance, be most carefully, gently, and patiently done. Were that the rule there would be few nervous, kicking, or otherwise fractious and bothersome cows, and there would be a greater yield of milk in the long run.

Recognising the inducing causes of the vices mentioned, prevention should be the order of the day on every dairy farm. It is impossible, in most cases, to cure confirmed vice, like kicking, but it may be temporarily prevented. There is no remedy for the ultra-nervous and sensitive cow or heifer; but some good may be done by more gentle milking, applying unsalted lard, vaseline, or benzoated oxide of zinc ointment to the teats each evening if they are tender or sore, allowing some relished feed to detract attention at milking time, and setting the cow's calf, or possibly some other very young calf, at her head before starting to milk.

There are many ways of stopping the kicking act. Of these may be mentioned buckling a strap around the cow's hind legs, just above her hocks; fastening a surcingle around her body, just in front of the udder, padding it where it crosses the milk veins and tightening it as required; tying the cow's head as high as possible at milking time; laying a heavy weight upon the loins, such as a sack of grain; tying up a fore leg; putting on side-line hopples, such as are used on a horse; and, lastly, disposing of the chronic kicker to the butcher, for fussing with such a beast may not pay.

PLATE 57.—DESTROYED PEAR ON A ROAD NEAR MUNDUBBERA.

Biological control is an important activity of the Prickly-pear Commission. The Commission's policy of a widespread distribution of cactus-destroying insects has been, and is, of ever-increasing assistance to landholders by the control they exercise over the fruiting of pear. The reinfestation of cleared areas from seeds carried by birds and beasts was in the past a factor that made many landholders despair, as they were thus faced by a never-ending expenditure in maintaining their areas free from pear.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

The following is taken from a little book published by the National League for Health, Maternity, and Child Welfare of England.

CHARACTER TRAINING.

IT is important to feed and clothe children in the best possible way. But it is much more important to train their characters in the best way.

Why do we especially want to train children well?

(1) To build up in them strong and noble characters.

(2) To make them fit to face life.

Mothers should begin to train their babies as early as possible. No baby is too young to know whether he can manage his mother, or whether his mother can manage him. Teach a baby at once that he will not get all he wants because he cries for it. A little crying will not hurt him, but to give him everything he cries for will hurt him very much. It will make his character weak, undisciplined, self-willed, uncontrolled.

The child's mind grows with his body, and as the one needs right conditions, so does the other, or it will be stunted.

Observe Nature's Methods.

How can we train and educate the mind and thus influence the character? To do this, we should interfere as little as possible with nature's methods. A baby has great power of concentration; he will look steadily at one thing for a long time, he will make a movement over and over again until he can control it. He should be left undisturbed; he should not be spoken to only for the sake of seeing him smile. Excepting during his regular occupations—his meals, sleep, and going out—he should not be disturbed when he is absorbed. When awake in his cot he should be able to see what is going on around him. This will always be enough to occupy him. As he gets older he should be taught to occupy himself, not to want constant attention from his mother. He will be much happier and give less trouble if he can occupy himself, but he will never learn to do it if he is taken up and amused whenever he cries. To help him to gain a habit of self-occupation is to help to educate his mind and character.

A baby's mental business is to learn all he can about the world in which he lives, and he does not like to be interrupted whilst learning. Do not speak to a child unnecessarily when he is absorbed and good.

We learn and grow by trying and succeeding. Therefore, unless it is hurtful to himself or to others, do not prevent a child from doing what he can for himself, thus teaching him self-reliance.

Mistaken Kindness.

One morning a child of two and a-half years came to breakfast. There were many delightful things he wished to do. He would climb on to his high chair, unfold his feeder, and painfully tie the tapes round his neck in front, and then turn the feeder round. He would take a spoon and crack his own egg. But instead of letting him do all these things, and so gradually learn how to do them, a grown-up rushed at him, tied his feeder and broke his egg, and he broke into a howl of disappointment.

Too often, out of mistaken kindness, people thwart a child when he tries, and enjoys trying, to attain his end by himself.

Do not indulge children, it makes them soft and selfish.

Do not nag or be harsh to them. You may make them cowardly and deceitful. Always be gentle, but always be firm.

Let your yes be yes, your no, no. Never shake children or box their ears or frighten them.

Moral education helps children to learn self-control, and remember you want to make them fit to go out into life, where they will need a great deal of self-control, where they will not find everything made easy for them, where they will not be spoit and get everything they want.

Regularity in good habits when children are small, is a very important part of moral education, because through good habits a child learns to make a right choice, to choose the good and refuse the evil.

Let him hear only kind words and pleasant voices. Let that to which he is accustomed be right, that to which he is unaccustomed be wrong. If he is never told to do unreasonable things he will see that obedience to the reasonable actions he is asked to do is right; and he will be more likely to refuse wrong when it comes his way.

The Cultivation of Good Habits.

Some day he will certainly have to choose between right and wrong. He can only choose rightly if he knows the meaning of right-doing. And whilst he is small this knowledge comes through good habits and trust in the kindness of those he loves best. The first time he makes a good choice he shows control over his will.

Therefore teach children from the beginning:—

(1) How to be obedient.
(2) How to be self-controlled.
(3) How to be unselfish.
(4) How to be pure.
(5) How to be truthful.

Teach them to be unselfish by encouraging them to do things for you and for others; by making them think of other people first, not of themselves first. Do not always slave for them, but show them how they can help you. A mother often makes her children selfish by doing everything for them and saving them trouble. That mother is not really a good mother. A good mother thinks chiefly of what is best for her children's characters, not of what is easiest and pleasantest for them.

To cultivate and practise good habits, bodily, mental, and moral, is to build up a great and good character; and the famous old saying bears this out:—

> "Sow an action, you reap a habit.
> Sow a habit, you reap a character."

Therefore teach your children to do right actions over and over again, until the right actions become habits; and the habits are built into a character.

THE ROSE.

"The rose is the national flower of England, and, supreme as it is among flowers, it feeds our pride in our country and in our selves as no other flower. Flowers quicken the sense of beauty so greatly that the right love of them is almost one with the sense of romance, and for the romance that lies in the extravagance of beauty no flower will bear comparison with the rose. Few types of women, even, will sustain that comparison, although there are many types of roses. The rose bursts upon us in the full pride of the summer, and is one with it, and is almost the essence of it. After it the summer has nothing further to reveal, for the gold of autumn is but decay, and even the carnation that might hold its own with any other flower, though it challenges the rose, and vies with it in every feature of scent and colour, equals it in none, and is by every single one of its charms sealed the rose's vassal. The rose, too, is among flowers the only fit emblem of life."—From "Samuel Langford, Unusual Criticisms," edited by Mr. Neville Cardus.

Plate 58.—Mrs. Irene Longman, M.L.A., Queensland's First Woman Legislator.

Mrs. Longman, who represents Bulimba in the State Parliament, is prominent in every progressive movement for the welfare of Australian women and children, and is interested particularly in the Country Women's Association and kindred bodies having for their object the recognition of the value of women's influence in our national industries and in our great work of nation building.

THE FIRST NEED.

''At the moment there seem no sort of doubt that the first need of the country is houses,'' writes Dr. Alington, headmaster of Eton, in the ''Evening Standard''; ''without decent housing it is a waste of time to talk of health, education, or wages, for the most elaborate schemes for looking after young people's physical or intellectual condition must fail if boys or girls have no decent houses to go to, and high wages are no real attraction to a decent father of a family if they do not mean that he can give his wife and children a proper home to live in. Surely the function of the church is clear; it should devote itself, in season and out of season, to declaring that it is the duty of every Christian man or woman to secure that the people of this country are decently housed, and that they have no right to any peace of mind until, at least in their own particular district, that result is secured. Can anyone doubt that if the church had concentrated on this elementary truth ever since the war the conditions to-day would be very different from what they are?''

MARKET GARDENING.

RADISHES.

These may be sown throughout the year, choosing showery, genial weather.

Sow thinly in rows. Succession sowings may be made every three or four weeks. Liberal waterings must be given during dry weather, as rapid growth is necessary in order to obtain crisp and good-flavoured roots. A light rich soil, with moist and open situation, in cool climates is recommended; but in hotter and drier districts a somewhat shady suitation is desirable. Radishes should be used as soon as large enough, as when old they become soft and tough.

Varieties recommended are—Red Turnip; Scarlet Turnip, white tipped; French Breakfast; Long Scarlet.

RHUBARB.

Rhubarb requires a rich, deep, and well-drained soil, and may be propagated from seed or by division of the roots—preferably the former. Seed should be sown in early spring, either in drills 3 feet apart or in a seed-bed. That sown in drills can be thinned out to 15 inches apart, leaving the strongest plants. A heavy mulching of stable manure and copious watering, if the weather be dry, are necessary to keep the plant in rapid growth.

Being a gross feeder, liberal applications of liquid manure can be made.

All weed-growths should be kept in check, and any plants showing signs of running to seed-heads should have these cut back at the first signs of forming. Where the plant is treated as an annual, all the leaves may be gathered as soon as large enough, but where its perennial use is desired, care should be taken to leave sufficient leaves for development of the plant.

Variety recommended—Victoria.

SPINACH.

Of the two varieties of spinach (the round and the prickly) grown for market, the prickly is the more hardy. For this reason, the latter is generally sown for the winter, and the round for summer crops.

The ground for spinach must be worked deep, and, as quick growth is necessary, the soil cannot be too rich. Sow the seeds in rows about 1 foot apart (some prefer the rows 2 feet apart). When the young plants have made four or six leaves, thin them out to from 9 to 12 inches apart. While growing, plenty of water is required to bring the crop to perfection, and the ground must be kept free from weeds.

Sow the "prickly" from March to May, and the round in August and September. Guano, lime, and salt are excellent for this crop.

The leaves will be ready for cutting in from 80 to 100 days from sowing.

SWEET CORN.

A vegetable of easy growth and one to which more attention should be given, owing to the fact that maize or corn is the staple grain grown in this State.

The soil required is one which is suited for any form of maize, and the cultivation is practically similar, with the difference that plants may be left closer in the rows.

The cobs should be taken as soon as the grains are fully formed, and before they begin to harden—what is known as the "milk" stage is the correct period. Cobs should be cooked whole, either roasted or boiled, and form a welcome addition to the vegetable diet so necessary in this climate, and where other forms of vegetables are frequently difficult to obtain. Seed may be sown in spring and early summer. The varieties recommended are—Country Gentleman; Stowell's Evergreen.

SWEDE TURNIP.

Although considered a farm crop suited to the needs of stock, swede turnips, when taken at the proper stage, form a welcome addition to the list of vegetables that may be considered as profitable to grow.

Turnips thrive under identical conditions of soil and climate, but swedes can safely be thinned out to greater distances, whilst the distances apart of the drills require to be somewhat greater. Swedes lend themselves to storage where such is desired, but this should be undertaken only where a favourable situation is procurable.

Sow in early autumn. The varieties recommended are—Elephant or Monarch; Champion Purple Top; Laing's Garden Swede.

SWEET POTATO.

The ideal soil for this crop is a sandy one, well supplied with organic matter. In a soil of this character the plants possess almost the hardiness of weeds, and the root develops well, being even in shape and quality.

Light loams, alluvial loams, and scrub soils are also suitable, but the greater amount of clay present the more unsuited is the soil for the growth of sweet potatoes.

Cultivation is similar to that for potatoes, and although often planted on the flat, better results are usually obtained from growing on ridges from 3 feet to 3 feet 6 inches apart.

Where early plants (late July or early August) are required they can be obtained by placing the selected tubers in a hot-bed.

The tubers are laid on the hot-bed and covered with sifted sandy soil and leaf-mould with a proportion of fine cinders mixed through the mass—keep moist but not wet.

The tubers will be induced to sprout with the bottom heat. Cease watering a few days before the time you plant out, so as to toughen and harden off the shoots. When about to plant, gently break the forward shoots from the tubers, and keep them in a bucket with the bottoms immersed in a thin clay puddle.

Plant out to the required distances in the field, taking care that only about an inch of the top of the shoots appear above the surface. The soil must be well firmed around the base of the shoots to encourage them to start into growth. The tubers will throw out a second growth, which can be used for planting out succession crops.

Preference is given by some growers to long cuttings, 18 to 24 inches in length, which are rolled round the hand before planting out.

A point of great importance is to see that the soil is thoroughly compacted about the base of the shoot and more particularly so during dry weather. Subsequent cultivation must be given to keep down weed-growths and conserve moisture.

Plants set out early in October should produce tubers fit for the table by the end of December. The period of growth, however, will be largely determined by the weather and the variety grown.

The mature stage can be determined by cutting one of the potatoes. If the cut surface dries white and does not turn greenish-black around the edges, the potato is fit to eat; if a milky juice exudes, which on exposure to the air turns black, the potato is immature.

During the latter part of its growth the sweet potato largely increases in weight; therefore, where bulk is an important factor, the tubers should be left in the ground as long as possible after they become fit for the table.

If tubers, after digging, are allowed to dry in the sun for a few hours and are then stored in dry sand they will keep good for some time.

Varieties recommended are—Pierson; Big Stem Jersey; Pink; White Maltese; Yellow Spanish.

CABBAGES AND CAULIFLOWERS.

With the sowing season for cabbage and cauliflower at hand, the results of recent variety trials at Bathurst Experiment Farm, New South Wales, will be of interest to growers of these crops.

The best early cauliflower during the past season, reports the "Experimentalist," was Maitland Market, followed by Early Phenomenal, Early Snowwhite, and a strain of Special Giant, in the order named. Maitland Market has proved the best early cauliflower under test to date, and it is intended to take this variety as the standard early variety at this centre.

The best late cauliflower was a strain of Six Months Special Giant, followed by Phenomenal Maincrop and departmental strains of Six Months Special Giant. Six Months Special Giant has proved the most satisfactory main crop variety in tests at this centre, and is well worthy of adoption as the standard main crop variety.

Succession has proved the best main crop cabbage to date at this centre; the local strain this season was far superior to the European strain, while the Departmental strain was somewhat superior to the commercial strain. Succession is of the Drumhead type, and the hearts are generally large and firm. The most satisfactory early variety was Enkhuisen Glory, which is of the Ballhead type: this variety had a very solid heart of medium size and showed excellent keeping qualities in the field, quite satisfactory hearts being harvested in late September. Winningstadt was considered the most satisfactory early to midseason variety after Enkhuisen Glory. It is a medium-sized early variety, with a pronounced pointed heart and the hearts are very solid and keep well in the field.

The best method of raising plants of cabbage and cauliflower is to sow the seed in drills in the seed-bed, allowing about 4 in. between the rows. Plants raised in this manner are usually sturdy, and differ from the lanky plants obtained from beds where the seed has been thickly broadcasted. The seed should be sown thinly, and each ounce of seed should sow a length of about 200 ft. The seed-bed should be about 4 ft. wide, and should allow of half being weeded from each side. A bed large enough to produce plants for one acre when seed is broadcasted would be 20 ft. long and 4 ft. wide. It is always advisable to put in sufficient seed to raise more plants than are actually needed. This allows for loss by pests, faulty germination, and the transplanting of healthy plants only.

The young plants should not be forced in the seed-bed, and should receive plenty of light so that stocky plants will be produced.

Under ordinary conditions plants should be ready for transplanting in six weeks from sowing, during cooler weather conditions taking a little longer. If possible, a dull day should be chosen for this work; should the weather be hot it should be done either early in the morning or late in the afternoon and the plants should be given some protection in the form of light bush or fern covering.

The distance of planting will vary according to the variety used. For smaller varieties of cabbage, 2 ft. 6 in. by 2 ft. is sufficient, and for larger sorts 3 ft. by 2 ft. If the soil is of poor quality the plants should be given more room, and should be planted 3 ft. by 3 ft.

Cauliflower plants should be set 3 ft. by 2 ft. in the case of first earlies, and up to 3 ft. by 3 ft. in the case of late varieties.

PLATE 59.

A measured quarter-acre of prickly-pear in this country in the Charleville district was poisoned at a cost of 17s. 3d.

Orchard Notes for March.

THE COASTAL DISTRICTS.

If the weather is favourable, all orchards, plantations, and vineyards should be cleaned up, and the ground brought into a good state of tilth so as to enable it to retain the necessary moisture for the proper development of trees or plants. As the wet season is frequently followed by dry autumn weather, this attention is important.

Banana plantations must be kept free from weeds, and suckering must be rigorously carried out, as there is no greater cause of injury to a banana plantation than neglect to cultivate. Good strong suckers will give good bunches of good fruit, whereas a lot of weedy overcrowded suckers will only give small bunches of undersized fruit that is hard to dispose of, even at a low price.

Cooler weather may tend to improve the carrying qualities of the fruit, but care must still be taken to see that it is not allowed to become over-developed before it is packed, otherwise it may arrive at its destination in an over-ripe and consequently unsaleable condition. The greatest care should be taken in grading and packing fruit. Only one size of fruit of even quality must be packed. Smaller or inferior fruit must never be packed with good large fruit, but must always be packed separately as required by regulation.

The marketing of the main crop of pineapples, both for canning and the fresh fruit trade, will be completed in the course of the month, and as soon as the fruit is disposed of plantations which are apt to become somewhat dirty during the gathering of the crop must be cleaned up. All weeds must be destroyed, and if blady grass has got hold anywhere it must be eradicated, even though a number of pineapple plants have to be sacrificed, for once a plantation becomes infested with this weed it takes possession and soon kills the crop. In addition to destroying all weed growth, the land should be well worked and brought into a state of thorough tilth.

In the Central and Northern districts, early varieties of the main crop of citrus fruits will ripen towards the end of the month. They will not be fully coloured, but they can be marketed as soon as they have developed sufficient sugar to be palatable; they should not be gathered whilst still sour and green. Citrus fruits of all kinds require the most careful handling, as a bruised fruit is a spoilt fruit, and is very liable to speck or rot. The fungus that causes specking cannot injure any fruit unless the skin is first injured. Fruit with perfect skin will eventually shrivel, but will not speck. Specking or blue mould can therefore be guarded against by the exercise of great care in handling and packing. At the same time, some fruit is always liable to become injured, either by mechanical means, such as thorn pricks, wind action, hail, punctures by sucking insects, fruit flies, the spotted peach moth, or gnawing insects injuring the skin. Any one of these injuries makes it easy for the spores of the fungus to enter the fruit and germinate. All such fruit must therefore be gathered and destroyed, and so minimise the risk of infection. When specked fruit is allowed to lie about in the orchard or to hang on the trees, or when it is left in the packing sheds, it is a constant source of danger, as millions of spores are produced by it. These spores are carried by the wind in every direction, and are ready to establish themselves whenever they come in contact with any fruit into which they can penetrate. Specking is accountable for a large percentage of loss frequently experienced in sending citrus fruits to the Southern States, especially early in the season, and as it can be largely prevented by the exercise of necessary care and attention, growers are urged not to neglect these important measures.

Fruit must be carefully graded for size and colour, and only one size of fruit of one quality should be packed in one case. The flat bushel-case (long packer) commonly used for citrus fruits does not lend itself to up-to-date methods of grading and packing, and we have yet to find a better case than the American orange case recommended by the writer when he came to this country from California in 1892, and which has again proved its superiority in the recent shipments of oranges from the Southern States to England. Failing this case, a bushel-case suggested by the New South Wales Department of Agriculture is, in the writer's opinion, the most suitable for citrus fruits, and were it adopted it would be a simple matter to standardise the grades of our citrus fruit, as has been done in respect to apples packed in the standard bushel-case used generally for apples throughout the Commonwealth. The inside measurements of the case suggested are 18 in. long, 11¾ in. wide, and 10½ in. deep. This case has a capacity of 2,200 cubic inches, but is not included in the schedule of the regulations under "*The Fruit Cases Acts*, 1912-1922." The half-bushel case, No. 6 of the Schedule above referred to, is 10 in. by 11¾ in. by 5¼ in. inside measurements with a capacity of 1,100 cubic inches. The case should be suitable for oranges and the half-case for mandarins. No matter which case is used, the fruit must be sweated for seven days before it is sent to the Southern markets, in order to determine what fruit has been attacked by fruit fly, and also to enable bruised or injured fruit liable to speck to be removed prior to despatch.

Fruit fly must be systematically fought in all orchards, for if this important work is neglected there is always a very great risk of this pest causing serious loss to citrus growers.

The spotted peach moth frequently causes serious loss, especially in the case of navels. It can be treated in a similar manner to the codlin moth of pip fruit, by spraying with arsenate of lead, but an even better remedy is not to grow any corn or other crop that harbours this pest in or near the orchard. Large sucking-moths also damage the ripening fruit. They are easily attracted by very ripe bananas or by a water-melon cut in pieces, and can be caught or destroyed by a flare or torch when feeding on these trap fruits. If this method of destruction is followed up for a few nights, the moth will soon be thinned out.

Strawberry planting can be continued during the month, and the advice given in last month's notes still holds good. Remember that no crop gives a better return for extra care and attention in the preparation of the land and for generous manuring than the strawberry.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The advice given in these notes for the last few months regarding the handling, grading, and packing of fruit should still be carefully followed. The latter varieties of apples and other fruits are much better keepers than earlier-ripening sorts, and as they can be sent to comparatively distant markets, the necessity for very careful grading and packing is, if anything, greater than it is in the case of fruit sent to nearby markets for immediate consumption. Instruction in the most up-to-date methods of grading and packing fruit has been published by the Department, which advice and instruction should enable the growers in that district to market their produce in a much more attractive form.

The same care is necessary in the packing of grapes, and it is pleasing to note that some growers are packing their fruit very well. Those who are not so expert cannot do better than follow the methods of the most successful packers.

As soon as the crop of fruit has been disposed of, the orchard should be cleaned up, and the land worked. If this is done, many of the fruit-fly pupæ that are in the soil will be exposed to destruction in large numbers by birds, or by ants and other insects. If the ground is not worked and is covered with weed growth, there is little chance of the pupæ being destroyed.

Where citrus trees show signs of requiring water, they should be given an irrigation during the month, but if the fruit is well developed and approaching the ripening stage, it is not advisable to do more than keep the ground in a thorough state of tilth, unless the trees are suffering badly, as too much water is apt to produce a large, puffy fruit of poor quality and a bad shipper. A light irrigation is therefore all that is necessary in this case, especially if the orchard has been given the attention recommended in these notes from month to month.

Farm Notes for March.

Land on which it is intended to plant winter cereals should be in a forward stage of preparation. Sowings of lucerne may be made at the latter end of the month on land which is free from weed growth and has been previously well prepared.

The March-April planting season has much in its favour, not the least of which is that weeds will not make such vigorous growth during the succeeding few months, and, as a consequence, the young lucerne plants will have an excellent opportunity of becoming well established.

Potato crops should be showing above ground, and should be well cultivated to keep the surface soil in good condition; also to destroy any weed growth.

In districts where blight has previously existed, or where there is the slightest possible chance of its appearing, preventive methods should be adopted—i.e., spraying with "Burgundy mixture"—when the plants are a few inches high and have formed the leaves; to be followed by a second, and, if necessary, a third spraying before the flowering stage is reached.

Maize crops which have fully ripened should be picked as soon as possible and the ears stored in well-ventilated corn cribs, or barns. Selected grain which is intended for future seed supplies should be well fumigated for twenty-four hours and subsequently aerated and stored in airtight containers. Weevils are usually very prevalent in the field at this time of the year and do considerable damage to the grain when in the husk.

The following crops for pig feed may be sown:—Mangel, sugar beet, turnips and swedes, rape, field cabbage, and carrots. Owing to the small nature of the seeds, the land should be worked up to a fine tilth before planting, and should contain ample moisture in the surface soil to ensure a good germination. Particular attention should be paid to all weed growth during the early stages of growth of the young plants.

As regular supplies of succulent fodder are essentials of success in dairying operations, consideration should be given to a definite cropping system throughout the autumn and winter, and to the preparation and manuring of the land well in advance of the periods allotted for the successive sowings of seed.

The early planted cotton crops should be now ready for picking. This should not be done while there is any moisture on the bolls, either from showers or dew. Packed cotton showing any trace of dampness should be exposed to the sun for a few hours on tarpaulins, bags, or hessian sheets, before storage in bulk or bagging or baling for ginning. Sowings of prairie grass and *phalaris bulbosa* (Toowoomba canary grass) may be made this month. Both are excellent winter grasses. Prairie grass does particularly well on scrub soil.

Dairymen who have maize crops which were too far advanced to benefit by the recent rains, and which show no promise of returning satisfactory yields of grain, would be well advised to convert these into ensilage to be used for winter feed. This, especially when fed in conjunction with lucerne or cowpea, is a valuable fodder. Where crops of Soudan grass, sorghum, white panicum, Japanese millet, and liberty millet have reached a suitable stage for converting into ensilage, it will be found that this method of conserving them has much to recommend it. Stacking with a framework of poles, and well weighting the fodder, is necessary for best results. All stacks should be protected from rain by topping off with a good covering of bush hay built to a full eave and held in position by means of weighted wires.

SUBSCRIPTIONS TO THE JOURNAL.

Subscribers are reminded that when a cross is placed in the square on the first page of the Journal it is an indication that the term of their subscription ends with the number so marked, and that it is advisable to renew immediately if they desire the retention of their names on our mailing list.

To farmers, graziers, horticulturists, and Schools of Art the annual subscription—one shilling—is merely nominal, and the charge is only imposed to cover the cost of postage. To them, otherwise, it is an absolutely free issue. Members of agricultural and similar societies who are not actively engaged in land pursuits are asked to pay five shillings a year, while the annual subscription charged to the general public is ten shillings.

Farmers particularly are urged to keep their names on our mailing list, for through the Journal they may keep themselves well informed in respect to the activities of the Department, and other matters with which they are directly concerned. Instead of sending just the annual subscription along it is suggested that, when renewing it, they do so for a longer term. For instance, five shillings would keep their names on our subscribers' register for five years. By doing this they would obviously help to reduce clerical labour as well as avoid the inconvenience to themselves of posting annually the very small sum necessary to keep their names on our mailing list.

On another page an order form may be found, and for those whose annual subscription is about due what is wrong with filling it up now and posting it direct to the Under Secretary, Department of Agriculture and Stock?

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

					MOONRISE.	
	February, 1930.		March, 1930.		Feb., 1930.	Mar., 1930.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	5.27	6.44	5.48	6.23	7.10	5 57
2	5.28	6 44	5 48	6.22	8.4	6 50
3	5.29	6.43	5 49	6.21	8.58	7.46
4	5.29	6.43	5.49	6 20	9.51	8 42
5	5.30	6 42	5 50	6.18	10.45	9.40
6	5.31	6.41	5.50	6.17	11.45	10.41
7	5.31	6.41	5 51	6.16	p.m. 12.48	11 45
8	5 32	6.40	5.51	6.15	1.54	p.m. 12.48
9	5.33	6.39	5.52	6 14	2.59	1 51
10	5.34	6.38	5 52	6.13	4.5	2 54
11	5.34	6.38	5.53	6.12	5 9	3.52
12	5.35	6.37	5.54	6.10	6.6	4.43
13	5.36	6 36	5 54	6 9	6.52	5.24
14	5.37	6 36	5 55	6.8	7 33	6 2
15	5.38	6 35	5 56	6.7	8.8	6.36
16	5.38	6.34	5 56	6 6	8.42	7.10
17	5.39	6.34	5.57	6.5	9.15	7.44
18	5.40	6.33	5 57	6 4	9.47	8.18
19	5.40	6.32	5 58	6.3	10.24	8.55
20	5.41	6.32	5.58	6.2	11.3	9.39
21	5.42	6.31	5.58	6.1	11.46	10.27
22	5.43	6.30	5.59	6 0	...	11.17
23	5 43	6.29	5.59	5.59	a.m. 12.34	...
24	5.44	6.28	6.0	5.58	1.25	a.m. 12.11
25	5.45	6.27	6 0	5.56	2.18	1.5
26	5.46	6.26	6.1	5.55	3.11	1.57
27	5.47	6.25	6.1	5.54	4.7	2.54
28	5-48	6.24	6.2	5.52	5.3	3.50
29	...	...	6 2	5.50	...	4.46
30	...	. .	6.3	5.48	...	5.40
31	...	...	6.4	5.46	...	6.35

Phases of the Moon, Occultations, &c.

7 Feb.	☾	First Quarter	3 26 a.m.
13 ,,	○	Full Moon	6 39 p.m.
20 ,,	☽	Last Quarter	6 44 p.m.
28 ,,	●	New Moon	11 33 p.m.

Perigee, 12th February, at 11 p.m.
Apogee, 25th February, at 10·30 a.m.

On the 6th Venus will be on the far side of its orbit, passing from west to east of the Sun. It will then be invisible, barely coming into view after sunset a month later.

About 2 p.m., on the 8th, the Moon will be passing from west to east of Jupiter on its northern side. This will be a good test for keen eyes, or it may be seen with binoculars.

Mercury, on the 15th, being on its greatest western elongation from the Sun, will rise two hours before it.

On the 21st, Neptune, in Leo, will be in opposition to the Sun. They will be rising as the Sun sets.

On the 23rd, at 10 p.m., the Moon will be passing Saturn when both are a long way below the eastern horizon, as they will not rise until 1·25 a.m. (at Warwick) on the following morning. For other places their rising may be reckoned as 4 hours and 19 minutes before the Sun.

Mercury will rise 1 hour and 26 minutes before the Sun on the 1st, or at 4·1 a.m. at Warwick; on the 14th it will rise two hours before it, or at 3·37 a.m.

Mars will rise 1 hour and 17 minutes before the Sun, or at 4·20 a.m. on the 1st; on the 14th it will rise 1 hour and 19 minutes before it, or at 4·18 a.m.

Jupiter will rise at 2·2 p.m. on the 1st, and at 1·23 p.m. on the 14th.

Saturn will rise 2 hours and 33 minutes before the Sun, or at 2·54 a.m. on the 1st; on the 14th it will rise 3 hours and 23 minutes before it, or at 2·14 a.m.

On the 1st of February the Southern Cross will be upside down before 4 o'clock in the afternoon, and three hours later will be coming into view low down in the south-south-east. It will not be upright until about half-past 3 in the morning at places as far east as Brisbane.

As the Sun will be in Capricornus until the 17th, the zodiacal constellations visible after sunset, from west to east, will be—Aquarius, Pisces, Aries, Taurus, Gemini, and Cancer, the latter reaching the meridian before midnight. By the end of the month Orion will set about midnight.

8 Mar.	☾	First Quarter	2 0 p.m.
15 ,,	○	Full Moon	4 58 a.m.
22 ,,	☽	Last Quarter	1 12 p.m.
30 ,,	●	New Moon	3 46 p.m.

Perigee, 13th March, at 6·24 a.m.
Apogee, 25th March, at 3·24 a.m.

One hour before sunrise on the 1st March the interesting sight of the two planets Mercury and Mars, only one Moon's-breadth apart, will be worth looking out for. They will be low down, about 17 degrees south of east.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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J. F. F. REID,
Editor of Publications, Department of Agriculture and Stock.

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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

A Bright Seasonal Outlook.

IMPRESSIONS of his recent official tour of the North were given by the Minister of Agriculture and Stock, Mr. Harry F. Walker, to the Press on his return. The whole of the North, from Capricorn to Cairns and the Atherton Tableland, was enjoying a remarkably fine season, said Mr. Walker, and the condition of the sugar-cane, maize, tobacco and other crops was excellent. The Minister had a strenuous tour with a heavy official programme to get through in the course of a very exacting itinerary in the middle of the monsoonal season. Heavy roads and swollen rivers were a daily experience. At each halting place farmers gathered to meet him and deputations and interviews often kept him engaged until midnight. The warm weather and beneficial rains, he observed, had caused phenomenal crop growth, and, altogether, the seasonal outlook was particularly bright. While in North Queensland the Minister paid a visit to the State Experimental Station at Bartle Frere, near Babinda, where experiments with bananas and other fruits were being carried out.

Mr. Walker was very much struck with the culture of tobacco near Mareeba, and he felt that when this year's crop was harvested in four or five months he should be able to speak with authority on the prospects of tobacco-growing in that area and in North Queensland generally. Experiments at Mareeba were being carried out very exhaustively. No pains were being spared to determine the most suitable variety and the best cultural methods to be adopted in the production of the crop.

The agricultural districts in the Central and Southern Divisions and the pastoral areas in the Western Division all benefited immensely by the recent continuous and generous rains, and, as a consequence, the seasonal outlook over nearly the whole of the State is particularly bright.

The Value of Trees—Dangers of Denudation.

STATEMENTS in a report issued recently by the Victorian Forests Commission are not without interest to Queensland farmers. That serious consequences are to be feared from forest denudation is a point very strongly emphasised in the report which states that the removal of forest cover, which affected otherwise assured sources of water supply, had created an alarming problem in Victoria. In the Ovens Valley gullies miles long, and in places 30 ft. deep and wide, intersected comparatively level country. The deepening of these gullies meant the steady lowering of the water table and the desiccation of good farm lands. Huge gullies had been torn back into the hill sides. Washaways along the routes of roads and railways were becoming an increasing nuisance. Especially was this so in the north-east of Victoria, where a serious and growing maintenance expense was being forced upon road and rail authorities to cope with the speeding up of erosion by deforestation. On the hill sides of the lower Mitta basin there were unusually deep soil beds. These were slipping from the underlying rock beds, and in this area, in a distance of about 20 miles, approximately 200 landslides were visible. Siltation would become increasingly serious as irrigation works were extended. Deforestation along the catchments should be thoroughly investigated. Denudation as a result of settlement or fire must bring in its train a whole sequence of siltation troubles for the irrigation works, but more especially for the Hume Reservoir scheme. Soundings at Burrinjuck indicated already the progressive effect of silting. It might take many years to assume serious proportions, but the time to take action in controlling deforestation was at present. Equally serious was the problem of soil erosion due to wind. That was daily becoming a more urgent problem in many parts of the Mallee. The result was seen in the sand-drift problem causing roads, railways and fences to be submerged in sand, while fertile flats were also reduced in value. The first measure of protection was found in the reservation of sufficient areas to act as protection forests, for which the Forests Commission was continually pressing.

Agricultural Research—Empire Co-operation.

THE 1927-28 report of the Rothamsted Experimental Station at Harpenden records the fact that more and more workers are arriving from the overseas Dominions to carry on their studies at Rothamsted. None but university graduates are eligible, and most are, or are about to be, on the staffs of Government or other agricultural departments—men who will become leaders in the agricultural communities of their respective countries.

The most important of all these Empire developments has recently been inaugurated. At the Imperial Agricultural Conference of 1927 it was decided to set up in Britain a series of bureaux to act as general clearing houses of information and to promote interchange of ideas and methods between the agricultural experts of the different parts of the Empire.

At the invitation of the proper authorities, the director and other members of the staff have already visited the Sudan, Palestine, Australia, New Zealand, and Canada to discuss agricultural problems and possibilities of co-operation. In addition, visits are being paid to the United States and to European countries to discuss problems and methods with experts there, and generally to improve the equipment of the institution and widen the knowledge and experience of the staff.

The Future of Agriculture.

PROVIDED that farmers follow the lines of scientific production most suited to their localities, and that meteorologists are able to discover more about the weather, a progressive future is predicted for agriculture by Sir John Russell, the noted agriculturist and director of the Rothamsted Experimental Station in England. Some time ago, it will be remembered, Sir John Russell visited Australia and New Zealand and had much to tell us about modern agricultural developments. In the course of a recent article he discusses, among other things, the effect of the extending use of labour-saving machinery on the farm, and science as applied to agriculture. It seems reasonable to expect, he says, that specialisation and the use of labour-saving machinery will continue to increase in agriculture; and the expectation seems so good that a great deal of the scientific work is being shaped in accordance therewith. Specialisation has the advantage that it enables the farmer to become an expert at his job; it facilitates combined action in buying and selling, which in these days of organised business is absolutely essential; and it enables the farmer to utilise the resources of science. For the scientific worker specialisation means close adaption of crops to environment; the scientific problems are those associated with the relationships between plant of nutrients, and climatic conditions. Supply of nutrients is controlled by means of fertilisers. The art of cultivation—now gradually being reduced to a science—allows the control of air supply and to some extent water supply and temperature to the plant root. The reaction of the soil—whether slightly acid, slightly alkaline or neutral—is controlled by additions of lime or sulphur. In dry regions irrigation adds to the water supply, though it also concentrates into streaks and patches the salt which, in arid climates, is distributed throughout the soil, making the areas barren. All these problems are capable of statement as scientific problems amenable to investigation by the ordinary methods of science. The adaptation of crop to environment is effected not only by changes in environment, but by changes in crop also; plant breeders are continuously bringing in new varieties of crops, and stock breeders are introducing new crosses among breeds of animals, the new forms in each case being more suitable to the surroundings, more acceptable in the markets, more resistant to diseases, or in other ways more acceptable than the old. Further, the scientific worker is gradually achieving some measure of control over plant and animal diseases and pests. Losses from these are always unwelcome, sometimes they are serious.

Finally, attempts are now being made to conquer the weather which, in the past, has dominated the farmers' activities. The constant factor of climate can already in part be overcome; dryness by irrigation; coldness, as in Northern Canada, by breeding varieties of plants requiring less time to complete their maturation. Even the variable factors of weather look as if they may in time be controlled to some extent. Modern statistical analysis as developed at Rothamsted shows the relationship between weather and fertiliser efficiency. If the general character of the season could be predicted, appropriate fertiliser recipes could be given to farmers, enabling them to take full advantage of the good features and to mitigate the bad effects of the harmful ones. Can meteorologists even make this prediction? If so, a great step forward in agriculture can be achieved.

The Need of a Forest Conscience.

COMMENTING on the tardy development of a national forest conscience, a writer in a recent issue of the Melbourne "Leader" expresses the opinion that every hill slope growing trees that holds back the soil, that fights erosion, should be treasured and improved. Every reservation that holds back the bank of a winding stream should be maintained on sound forestry principles. The day may come when the streams have to be straightened out, but always and for ever every bank should be protected from the action of flood waters by a fringe of good timber trees. Every pound of soil that goes down creek or river is so much loss. Good work is being done by the Forestry Commission, but much more is still needed, and the commission should receive the full support of every citizen and Parliament in its endeavours to rectify the mistakes of the past. Seventy years is but a beginning in forestry matters, but the records and results obtained during that period should form a guide to and an excellent basis for the operation of any future forest policy. Facts may be stubborn, but they are a much more lasting foundation for success than individual fads. It has taken the Americans some 260 years to bring their great forests to the verge of destruction, but Australians with the experience of the world before them have taken only a little over ninety years to bring their forests to the same condition of partial ruin. Constant demands are being made to throw open forest reservations for settlement, and bearing in mind the small area of good land now available, and the keen competition for such good land for occupation, it is fairly certain that many of the existing reservations as they are denuded of timber supplies will have to be utilised for settlement, and the proposal to make it compulsory that a certain area of all land under settlement must be devoted to forestry purposes is a wise and justifiable one.

With the development of systematic tree planting economics and æsthetics are both served and all concerned, landholder, school, township, State and nation will, in time, co-operate to secure and maintain such plantings. Parks, playgrounds, and recreational areas are a part of modern life. They could, in many instances, be improved and extended as national parks, and in time become a source of income, and at the same time furnish material for industry.

Every provincial centre or country town should seriously consider the possibilities and potentialities of a municipal timber reserve. It is not sufficient to confine activities to State school plantations. The need of wood for industrial purposes is already apparent, and the co-operation of all factors—town, country, State and nation—will only be effective when all realise to the full the urgent need for systematic forestry development and re-afforestation. One thing, however, is essential to the success of the proposal. The adaptability of the various trees to the various sections of the States should be made available, as well as the uses to which they may be put. Facts concerning what to plant, when to plant, where to plant, and how to plant should be prepared and widely distributed. Accurate information is the basis of successful effort, and the services of such bodies as the Forest League, the Tree Planters' Association, and other similar bodies should be availed of in an effort to arrive at the most suitable trees to plant, not only for each district of the State, but also for future utilitarian purposes.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director, Bureau of Sugar Experiment Stations.

In this series of articles is incorporated the material for a revision of a Bulletin on the Sugar Industry which Mr. Easterby prepared some years ago. Since then the industry has developed to such a degree, and the conditions have so altered, that a revision has become necessary. At the same time, it is recognised that the sugar industry in Queensland, which supplies 96 per cent. of Australian-grown sugar, is so many-sided and is governed by so many factors that it forms in itself a complicated study of no mean magnitude, and one with which it is impossible to deal completely in much less than a large volume. The industry has also in recent years become bound up closely with both Federal and State policy.

Mr. Easterby has covered his subject thoroughly under several heads, each of which he discusses with all possible brevity while retaining every essential of a very interesting narrative.

In this instalment Mr. Easterby continues the review of the development of the industry in pre-Federation days.—ED.

PART III.

(a) Short History of the Industry prior to Federation.

(Continued.)

The Government of Queensland for the past sixty years or more have naturally been keenly interested in the welfare of the sugar industry, recognising that it was an asset of considerable value, and later on that it was destined to become Queensland's largest agricultural industry, giving employment to thousands and distributing millions in the shape of wages. The interest displayed in the industry is partly reflected in the number of Acts passed for its regulation and betterment.

Before the nineties, the Government of the day imported sugar-cane plants, and propagated canes for distribution in the Botanic Gardens, and from that time on have frequently brought out the best varieties growing in other countries.

In 1893, the Department of Agriculture sent Mr. Ebenezer Cowley—at that time overseer of the State Nursery at Kamerunga—to New Guinea, in order to obtain new kinds of sugar-cane, and he came back with a number, of which Batoe, Chenoma, Oraya, and Kikarea did the best, and were grown for some time. Indeed, Kikarea can still be found in the Logan district.

In August of 1895, Mr. Henry Tryon, Entomologist and Pathologist to the Department of Agriculture, was commissioned to proceed to New Guinea and collect a large number of sugar-cane varieties, which were to be sent to the State Nurseries of Kamerunga and Mackay in Queensland, and also to the Department of Agriculture in New South Wales. Mr. Tryon brought back sixty-six varieties, including the well-known

Plate 60.—Interior of Laboratory, Sugar Experiment Station, Mackay.

"Badila," which is considered to be the best variety ever introduced into Queensland. The sugar industry undoubtedly owes a great debt of gratitude to the Department of Agriculture for this cane, to which successful canegrowing in the North is largely attributable. Seeing that in many of these areas 95 per cent. of the cane grown is of this variety, it is not stretching the point to say that quite a number of growers owe their success as cane farmers to it.

In 1898, the Government decided to establish a Sugar Experiment Station at Mackay, and a laboratory was erected on the grounds of the State Nursery and put under a chemist-in-charge. A strong feeling about this time made it evident that the sugar industry required scientific guidance and advice. Comparisons were made between yields of Queensland and those of Hawaii, and it was felt that an independent inquiry into the industry should be conducted. Representations were made to the Government for the engagement of a suitable expert to report upon the condition of the sugar industry in Queensland, and it was arranged for Dr. Walter Maxwell, at that time Director of the Experiment Station of the Hawaiian Sugar Planters' Association, to visit the colony and report upon its sugar industry.

In January, 1900, Dr. Maxwell presented his report to the Secretary for Agriculture and Stock. He reviewed the climate, geological formation, and soils, and pointed out that soils may be of great natural fertility, but if certain elements were removed they must be restored. He stated that in every district from Cairns to Isis recollections were preserved of the crops that used to be grown, from 70 to 80 and even 100 tons of cane per acre, while at the time of his inspection they had decreased considerably. He dwelt on ratooning, pests, disease, and irrigation. In speaking of the cane grown he said:—

> "It is found that most of the large sugar-growing estates, which were originally in the hands of the large planters, have been cut up into farms and rented or sold to numerous canegrowers, particularly in the case of the areas that are furnishing cane for the Government Central Mills the growing is done by farmers who have taken up and own or occupy those lands. These facts place before us a situation that is almost unique and peculiar to Queensland. In other canegrowing countries the estates are in the hands of extensive owners or controlled by large corporations, which state carries with it the consequence that a minimum number of white men are located on the land. In this colony the ownership or occupancy embraces a vast number of strong, responsible, and progressive white men, who are planted over all the sugar-growing areas. These men furnish the material which puts the mills into operation, and, as the mills depend wholly upon the field, it appears that the future of the sugar industry of the colony is very much in the hands of these numerous and small canegrowers.

> "The principle of small ownership and occupancy is right and sound, leading as it does to the dividing of the matters at stake amongst a maximum number of responsible men, it furnishes a broad and safe basis for the industry. Small ownership and occupancy, however, have their peculiar drawbacks and dangers. In the numerous cases of occupancy by men who are renting the land, it has been found that the tenure is extended to farmers almost wholly without conditions. Under such agreement the lands can be cropped and recropped, the fertility reduced year after year and nothing returned to the soil, and the mills depending upon them closed for need of material. Whilst stating that these are the results that can follow and are following such a mode of tenancy, it has to be understood that farmers are not the only causes nor even the chief causes of soil beggaration; in fact the tenancy of the farmers is too recent in many cases to be responsible for the state of the soils, and, moreover, it is known that some large estates have done better since they passed into smaller hands. In the case of farmers who occupy and are working their own freeholds, the conditions are different, but the results may be and are, in many examples, the same. Many of these owners are men who were farmers in other countries, but their experience has not necessarily prepared them for the agriculture of cane. Again, numerous others were the followers of divers trades and crafts, and land work with them is a very recent thing."

The report then went on to deal with the manufacture of sugar.

Dr. Maxwell's recommendations were that the canegrowers and manufacturers' sections should form themselves into one body to be known as "The Sugar Growers and Manufacturers' Association of Queensland," to introduce modern scientific methods of agriculture, and still further improve modes of manufacture; that three Experiment Stations be provided, and a Director be appointed to establish such Stations and engage chemists, &c., examine soils, institute experiments, inspect mills, and advise canegrowers.

The outcome of this report was the introduction and passing of an Act to provide for the establishment and control of Sugar Experiment Stations, known as *"The Sugar Experiment Stations Act of* 1900."

Under this Act Dr. Maxwell was appointed the first Director, and took over the existing Sugar Experiment Station at Mackay. A chemical laboratory for soil, fertiliser, and other analyses was erected at Bundaberg, but the Experiment Stations for the Southern and Northern areas were not established till after the departure of the first Director.

It is rather curious that the heavy yields of cane mentioned as having been obtained in the early days in Dr. Maxwell's report, and even to this day spoken of by old canegrowers as being common on virgin soils, were not duplicated when the new lands of Babinda, Tully, and South Johnstone were opened up. Certainly, heavy crops were harvested, but little was heard of 80 and 100-ton crops. Were the early pioneers of the sugar industry looking fondly back to their early struggles, and perhaps letting their imaginations have full play, or were these big crops actual realities in the days when the scrubs were plentiful and the land in its pristine condition? Of course, too, it has to be remembered that many of the crops in the Southern areas were from eighteen months to two years old.

The sugar production from 1891 to 1900 varied from 51,219 tons to 163,734 tons. In 1901, there were still some sixty sugar mills in operation.

Wages at this period (1900) were on the low side, although money had much more purchasing power than it has to-day. The common rate of wages for white field labourers, of whom there were not many, was about £1 a week and keep.

Nearly all the cane was cut at that time by Kanaka labour. It was estimated that a "boy" at 2s. 6d. per day often cut and loaded into a dray or wagon 3 tons of cane, at a cost of 10d. per ton, while with portable line the cost was somewhat higher, the average being 1s. 3d. per ton. The cost of cutting by white labour at that time was 3s. 6d. per ton.

The costs of growing cane on forest land and scrub, by white and black labour, have been given in a booklet on the Town and District of Mackay, as under:—

FOREST LAND.

	White Labour.			Polynesian Labour.		
	£	*s.*	*d.*	£	*s.*	*d.*
*Clearing, quarter cost	1	17	6	1	0	0
Ploughing four times, average ⅞-acre per day	1	14	6	1	12	3
Harrowing and rolling	0	10	2	0	6	3
Planting (cutting, carting, drilling, laying, and covering)	1	2	8	0	14	2
Hoeing three times	1	10	0	0	15	0
Supplying	0	10	0	0	5	0
Cultivation with horse implements	0	13	4	0	9	3
	£7	18	2	£5	1	11

* Only quarter cost against the first crop is here charged.

SCRUB LAND.

	White Labour.			Polynesian Labour.		
	£	*s.*	*d.*	£	*s.*	*d.*
Brushing and falling	2	0	0	1	0	0
Burning and clearing	2	5	0	1	2	6
Holing	3	10	0	1	15	0
Cutting plants, carting, and planting same	1	5	0	0	10	0
Hoeing three times	3	7	6	1	10	0
	£12	7	6	£5	17	6

Only the cost of labour in connection with field operations is included, such items as supervision and depreciation not being taken into account.

These figures were stated to have been collected very carefully at the time.

At the end of last century it was considered that the sugar industry was not being conducted upon the most economical and advanced lines, and that in many directions it could be improved. At that time the number of small uneconomic and inefficient mills were commencing to disappear, and more attention was beginning to be paid to the problems of manufacture. It was acknowledged that more progress had by that time been made since the days when every planter had his own factory, and when thirty mills in one district were turning out an absurdly low tonnage of sugar. It was, however, recognised that scientific control must enter into sugar making, and the most up-to-date mills began to search for chemists who could give assistance in manufacture. With the practice then coming into being of making raw sugar for the refiner instead of every mill being a law unto itself and searching for a market, the price became more certain, and the manufacturer could ascertain more definitely what he was likely to get for his product. Mechanical labour-saving appliances began to be used, at first with some hesitation, but as time went on and labour began to gradually increase in price, such methods became more widely favoured. It must be remembered that at the beginning of this century 40,000 tons of cane for a single mill was considered a big crop.

Some of the figures of one of the principal mills in the Mackay district for the 1900 season are here given:—

Tons of cane crushed	21,617
Number of growers	73
Tons of sugar manufactured—88 net titre	2,530
Average tons of cane to ton of sugar	8·54
Average cost of cane at the weighbridge	£0 13 8
Average cost of manufacture in mill per ton of sugar	£1 2 2
Average cost of manufacture and all expenses to f.o.b.	£7 8 2
Total cost per ton of sugar including maintenance and interest	£8 17 10
Output realised per ton	£9 19 7

We are now approaching the formation of the Australian Commonwealth, which carried with it tremendous changes to the Queensland sugar industry. These will be dealt with in the next sections.

[TO BE CONTINUED.]

USEFUL AND INTERESTING.

A Yerra (Gayndah Line) farmer writes (10th January, 1930):—"I have always found the Journal useful and interesting, and appreciate its earlier arrival."

Bureau of Sugar Experiment Stations.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS.

Inspection Before Planting Cane.

Nature's law, that like produces like, is too often overlooked, although in the long run any little trouble or expense that may be incurred by the observance of it will be found to have been well worth while.

The following hints, in connection with the matter of selection of suitable setts for planting, should prove useful to those cane farmers who aim at getting best results.

Damage to Setts by Larvae of Bud Moths.

Firstly, the question of clean healthy buds should always receive attention, as injury to these by small caterpillars of our bud moth (*Opogona glycyphaga*) is very likely to occur in soft varieties of cane like "Clark's Seedling," &c.

Badila also, is freely attacked, the damage, however, being usually confined to the rind. The presence of this cane pest is at once betrayed by the occurrence of short meandering tracks, gnawed by the caterpillar on the surface of the rind close against a node.

Weevil Borer *(Rhabdocnemis obscurus* Boisd.).

The presence of this formidable beetle is revealed by conspicuous holes in the ends of setts, indicating spots where its tunnels have been cut through transversely. Any grower aware of the occurrence of such injury, but still making use of these borer-infested plants, is deliberately courting future trouble and ultimate monetary loss. Only by strict examination of all canes procured from outside plantations, can one hope to keep this weevil borer from obtaining a footing in clean canefields.

Mealy Bug *(Pseudococcus* sp.)

Most farmers are familiar with these soft-bodied semi-globular insects which have the appearance of being dusted with white powder, and are found rather commonly under the older leaf-sheaths of cane. Although at present a minor pest in Queensland, it is not advisable to plant setts harbouring colonies of this mealy bug. Their presence on plants can be determined by removing any loose portions of leaf-sheath that may be adhering to the setts.

Advantages of Intensive Cultivation.

Unfortunately, this interesting subject, although of primary importance to our growers, seldom receives the attention it deserves. The more thorough cultivation the greater likelihood there is of our obtaining maximum results.

It should be remembered that a cane stool is, after all, a living organism, and just as animals respond to generous treatment, so it is with members of the vegetable kingdom.

Frequent cultivation to a depth of from 5 to 8 inches or more, on land of a friable nature, and which is well drained and properly manured, cannot fail to establish ideal conditions for plant growth and healthy development.

In such well cultivated land the fibrous feeding roots of young cane are able to extend some distance into the soil, instead of, as happens in poorly cultivated fields, being forced to grow quite close to the surface; thus permitting, in the former case, a longer period of time in which to disturb the cane grubs, before the stools have grown too high, or the roots taken full possession of the soil between the rows.

CANE PEST COMBAT AND CONTROL.

Mr. E. Jarvis, Entomologist at Meringa, reports as follows on the entomological work carried out at Meringa Experiment Station during the period December, 1929, to January, 1930, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

Interesting Occurrence of Cane Beetles.

On 17th January, notice was received at this station of a serious outbreak of greyback cane beetles on a plantation near Banna. So numerous were these cockchafers over an area of about 70 acres that one or more specimens probably occurred

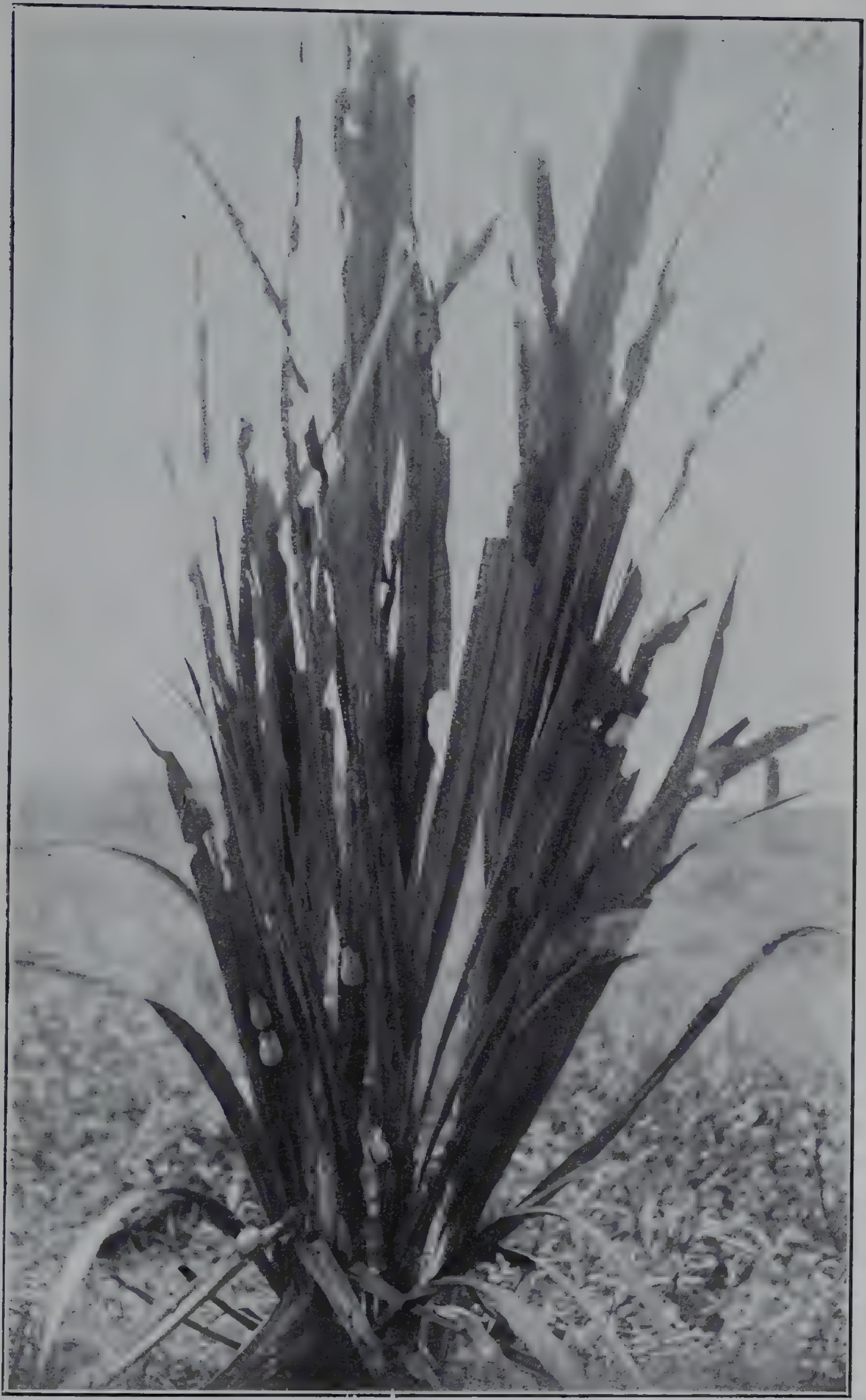

Photo.: J. H. Buzacott.]

PLATE 61.—YOUNG CANE STOOL OF VARIETY D. 1135, SHOWING LEAVES BADLY EATEN BY GREYBACK COCKCHAFERS (*Lepidoderma albohirtum* Waterh.).

Note these beetles resting on the leaves, near base of stool.

on at least 50 per cent. of the stools. In many cases from twenty to thirty or more were counted on a single plant, while on badly infested acres the leaves were practically destroyed, little more than the midrib remaining. The nature of such damage was peculiar and characteristic, the edges of blades which had been left close against the midrib being nibbled in such manner as to present a scalloped appearance (see accompanying photograph). On young central leaves, however, the blade was often entirely stripped to a distance of from 12 to 18 inches back from the point, leaving merely string-like filaments (the midribs).

Mr. J. H. Buzacott, Assistant Entomologist, who was sent to inspect this assemblage of beetles, was fortunate in securing some unique photographs of injured stools with greybacks resting on same. Some boys who were collecting at the time obtained two and a-half kerosene tins full of beetles from 4 acres of D. 1135 in a few hours, an amount representing about 11,000 female cockchafers. In such cases the common-sense remedial method of destroying as many of the beetles as possible in the immediate vicinity of an outbreak is all that can be done in the way of control, and usually proves effective. The importance of such work is realised when one considers that the above-mentioned two and a-half kerosene tins full of beetles captured at Banna would have produced (presuming half these specimens to have been females) about 326,400 grubs, a number able to completely destroy 6 acres of cane. It appears, therefore, that in such cases of infestation it is quite possible to effect a considerable saving, even by a few hours' collecting. This being so, the value likely to be secured from a well-organised campaign against this cockchafer during the first couple of weeks of the flighting season must surely be apparent to all.

Factors Accountable for Alarming Local Outbreaks of Greyback Cockchafers.

As a general rule greybacks, after emerging either from forest or cane lands, fly at once to the nearest feeding trees, and are seldom found resting upon or eating cane leaves. As a matter of fact, this food plant is anything but a favourite, being seldom eaten unless under compulsion or as a result of prevailing abnormal conditions.

With regard to the recent outbreak at Banna it would seem that these beetles probably emerged from cane land which had been much damaged by grubs last season. Had such infestation been at the rate of, say, five grubs per stool throughout an area of about 50 acres, the beetles escaping from this cane land must have numbered at least 2,000,000.

Owing to the long-continued dry weather experienced they were doubtless much weakened, and may have only just managed to reach the surface. The only food immediately available was found to be cane leaves, so, in order to gain sufficient strength to enable them to fly, they were probably forced to eat the first thing that offered in the way of food. Normally, this species (*Lepidoderma albohirtum* Waterh.), after emerging from the soil, endeavours without delay to reach the nearest feeding trees, amongst the top branches of which mating usually takes place at a height of from 20 to 30 feet from the ground.

In the case under consideration the beetles at Banna, after regaining strength, are likely to leave the cane, and seeing that there are few trees close at hand may travel several miles in search of suitable food, in which case they are not likely to return, but will probably lay eggs in the nearest cane land.

In the event of the Banna outbreak not having arisen locally from grub-infested cane fields, the presence of so vast an assemblage of beetles could be accounted for from the standpoint of migration. As mentioned in previous reports, the invasion of cane land in the early days around the Mulgrave and Highleigh districts was apparently brought about by beetles which had migrated there from extensive breeding grounds. The natural laws governing the movements of certain insects are too complex and varied to deal with here, but it may be mentioned that several species, including our greyback cockchafer, when chancing to multiply exceedingly over restricted areas, generally seek to migrate when possible in order to ensure a wider distribution of eggs, and to establish their grubs or larvæ on different classes of soil, thereby hoping to reduce the percentage of mortality likely to be caused by birds, parasitic insects, and other natural enemies.

The danger which invariably threatens any animal (man included) when happening to become overcrowded, or to increase abnormally, not only sounds a note of warning, but at the same time calls for wider dispersion of the species, as being the simplest and most effective remedy.

We will assume that the greybacks in question had migrated from forest country, and upon reaching green cane lands in the vicinity of Banna decided to come to rest in that locality. Had this happened the source of invasion would probably have originated either on some portion of the forest land reserved for a national park in the parishes of Sophia and Bellenden Ker, or else on the State Forest Reserve in Cadgarra, lying south-west of Sophia and south of the parish of Grafton. In the former case the line of flight chosen by these beetles would have taken a south-easterly direction over the country lying between the Mulgrave River and the Pyramid Range.

It seems more likely, however, that the breakaway in the present instance would have occurred in the Cadgarra area, in which case the course of flight would probably have skirted the western slopes of the Pyramid Range, thus landing these cockchafers right over the centre of the districts of Banna and Aloomba.

FIELD NOTES.

Extracts from a Report on the Lower Burdekin, made by Mr. Albert P. Gibson, Field Assistant to the Director of Sugar Experiment Stations (Mr. H. T. Easterby), at the end of 1929:—

Canegrowing in the Lower Burdekin district is of a highly interesting nature owing to the fact that cane in these areas is irrigated. Considerable all-round improvements have been made here during the last few years, though much still remains to be done.

Work in the field and mill during the 1929 season proceeded without interruption. The crop in quantity and quality was excellent, and the greater part of it was crushed when it contained its maximum amount of sugar.

The total tons of cane milled at the four factories in this district constituted a district record and is as follows:—

	Tons.
Pioneer	134,789
Inkerman	164,328
Haughton	79,547
Kalamia	179,000
	557,664 tons.

Rainfall.

The average rainfall is about 42 inches per annum, but this is badly distributed. Most of it falls the first three months of the year, and in consequence irrigation is generally required to ensure a payable crop.

Cultivation.

Very often the depth of tilling and ploughing the same depth continuously forms a hard pan. This retards drainage, aeration, and deep rooting.

Drain where possible, plough in trash or legumes, and it is thought the application of molasses would gradually improve the soil texture.

Prepare the soil well before planting; some farmers strive to do this afterwards. The depth of ploughing and the number of ploughings really depends on the soil thickness and its texture; a shallow soil may be deepened and improved by gradually ploughing deeper.

Farmers should get to know their soil types and study cultivation, fertilising, and good disease-free varieties of cane most suitable for them.

Irrigation.

Water suitable for irrigation is generally cheaply and abundantly obtained in this district. The water after reaching the surface is gravitated through round or half round galvanised iron flumes or open earth ditches to the field supply drains, from whence it is delivered through pipes 2 ft. long by 2 in. diameter (placed in the drain banks) to the cane or interspace rows; upwards of sixty of these are sometimes watered at once.

Recommendations.

1. It is of paramount importance to have good drains, and these should be kept grass free. Much valuable time and water and money are saved when these are judiciously made and kept clean.

2. Dry farm newly planted cane as long as practicable. Irrigate the cane row until the foliage covers the bare spaces. By so doing deeper rooting is encouraged.

3. Watering the cane in the interspaces has the tendency to form a greater number of surface roots.

4. Irrigate the ratoons immediately after the trash is burnt and cultivate as soon after as possible.

Major Varieties Grown.

New Guinea 15 (Badila) and B. 208 grown on the better lands. H.Q. 426 and E.K. 28 grown on the poorer lands. B. 208 this year again has done remarkably well. This variety when irrigated shoots at the stem badly after a growth check is experienced.

Pests and Diseases.

Destruction of the crops by pests and diseases is less than in any other Queensland district. Grubs and giant white ants have been responsible for some damage. It is recommended that all dead timber in or surrounding the field affected be removed. The control of this latter pest requires much study, as it is possible that it may find sugar-cane so succulent that it will be preferred to their natural food.

New Crop Prospects.

It was necessary to irrigate most of last year to keep the crop growing, and the increased number of waterings will naturally raise the cost of production. The present crop has had a favourable start and looks promising, though generally it is less advanced than it was this time last year. The area to be harvested for 1930 is said to be greater than last year.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report for the month ended 12th January, from the Assistant Entomologist at Mackay, Mr. A. N. Burns.

Occurrence of Chrysomelid or Leaf-Eating Beetle *(Rhyparida limbatipennis* Jac.) at Oakenden.

Last month whilst visiting several farms in the Oakenden district with reference to damage caused by grubs of the black stem gouger beetle (*Pentodon australis* Blkb.), attention was drawn to the numerous dead shoots in many of the stools. Large shoots were not affected, but in some stools as many as four or five of the small shoots were quite dead. Opening up the basal portions of some of the partially dead ones revealed the presence of numbers of small, whitish-curved grubs, which, when later bred through at the laboratory, turned out to be the above species. Some of these grubs were also found in the ground around the stools, as well as several pupae.

Nature of Injury.

The young larvae enter the basal portions of the shoots below the ground level and eat out the whole of the interiors for the length of an inch or more; this causes the aerial portions of the shoots to die. One of these grubs is evidently capable of being able to destroy several shoots, because grubs of all sizes were found in shoots which had only been attacked for a short period before inspection. This was evident because only small holes were eaten into the sides of these shoots, and the young grubs were in these holes. In the same stools there were dead shoots with their bases eaten out and quite rotten.

Larva.

Length when fully grown (in curved position) about ¼ inch (7 mm.) Colour, dirty creamy white. Head pale yellowish brown, mandibles black, labrum or upper lip (plate-like between mandibles) grey-black. The first body segment behind the head bears a large yellowish dorsal marking. Legs pale yellowish, faintly tipped brown. If viewed under a magnifying glass the sides of the body will be seen to have a thin row of fine whitish hairs—two or three to each segment.

Pupa.

Length slightly less than ¼ inch (about 6 mm.), pale yellowish white but becoming dark brownish black just before emergence. The head and eyes are the first to darken, and that usually takes place about eight days after the change from larva to pupa. The posterior end of the anal segment carries two brown spines, slightly curved outwards, and fairly widely separated at their bases.

Beetle.

The adult beetle is brownish yellow in colour with the posterior ends of the femors (thigh joints) of the legs darker. The eyes are large and prominent, black. The antennæ or feelers are long, eleven jointed, light brown in colour, and have the last five joints darker than the others. The surface of the thorax and elytra are minutely punctate, the punctations on the elytra forming definite longitudinal rows. On each elytron are two dark-brown streaks and a small dark spot; the longest and more noticeable of the two streaks is nearest the inner edge of each elytron and is situated at about two-thirds from the thorax, the other and shorter streak is near the outer edge of each elytron and is about half way from the thorax. The brown spot is situated on the "shoulder" of each elytron, laterally, and where the slope commences towards the dorsal surface of the elytron. This insect is rounded in appearance but is longer than broad. It measures just less than ¼ inch in length (7 mm.) by almost 2/10-inch in width (4 mm.).

This beetle is regarded as being a minor pest of sugar-cane only, and it is doubtful if the extent of damage caused by it calls for artificial control measures. Plenteous working of young cane is very helpful in keeping down insect enemies of this nature; many are thus exposed to the surface and are therefore destroyed by ants and insectivorous birds. Should, however, a great number of shoots be attacked, the cutting out as low down as possible of those which are just commencing to wither will remove a good many of the grubs. The grubs will have forsaken the dead shoots, therefore it is useless to remove these.

Emergence of Cane Beetles.

Following the welcome rains that commenced on the 28th December, 1929, a general emergence of cane beetles and associated species occurred. It is evident that the long and continued dry spell prior to these rains has been responsible for many beetles perishing in their cells. Even at the time of writing though there has been a total of well over 7 inches of rain, it has not penetrated to a depth of more than about 15 inches in some places. In view of this it is likely that fresh beetles will still be emerging from day to day, so that the complete emergence will be spread over a period of from two to three weeks. Greybacks (*L. albohirtum* Waterh.) are flying freely each evening and large numbers are being collected daily from the feeding trees, especially along the river from Rocklea to Dumbleton (near Mackay). Other receiving centres are also getting large numbers daily.

The flight of frenchi beetles (*L. frenchi* Blkb.) in the vicinity of the Experiment Station is considerably less than it was last year, and the beetles only appeared in appreciable numbers for the first few evenings during the first week of rain. Collectors near the Station reported getting several pounds each evening from fences, shrubs, &c., and in the same areas are now finding it difficult to collect 1 lb. during an evening. This would appear to indicate that the long dry season has accounted for many of these beetles, because last year they were numerous for at least three weeks after the rains commenced.

The numbers of the "Anomala" or small blue-bronze beetle (*A. australasiae* Blkb.), which may be seen at dusk collected on fence posts and lantana and franjipanni flowers, appears to be in about the same force as last year. This species would not probably suffer so much from the effects of the dry spell as other species because it does not pupate very deep, consequently the beetles would have a better chance of escape when the rains came. About a month ago at Peri, 5 miles from Mackay, a small local emergence of these beetles took place after a thunderstorm which yielded about half an inch of rain. No other cane beetles were noted there at that particular time.

The Christmas Beetle (*A. boisduvali* Boisd.) and Allied Christmas Beetle (*A. porosus* Dal.) are fairly plentiful on their feeding trees which are chiefly guava bushes and blue gum trees (*E. tereticornis*). They do not appear, however, to be in such great numbers as they were last season, because trees which were then almost completely defoliated are so far scarcely showing any signs of their ravages. Collectors near the Station report that they are not getting as many of these beetles as they usually do. This, of course, may not apply to all localities around Mackay.

The Golden Beetle (*C. mastersi* Macleay) appear to be in about the same numbers as last year; the writer visited some of its feeding trees (the prickly cork tree, *E. verspatilio*) last week, and the beetles were equally as plentiful as they were there last year, except that last season they appeared fully three weeks earlier, in the middle of December.

The large blue-green beetle (*R. aeneus* Fab.), which is usually fairly plentiful on Moreton Bay Ash trees (*E. tesselaris*), appears to be scarcer this season. Two examples only have so far been collected by the writer whilst collecting beetles, and collectors report that this species is scarce this season.

The green beetle (*C. rayneri* Macleay), usually found fairly freely on Bloodwood trees (*E. corymbosa*), is being collected in numbers from the paper bark tea-trees (*Melaleuca leucadendron*) growing along the river banks. This species was not so plentiful last year as it is at present.

It can therefore be fairly reliably estimated that the beetles' flight in general is not so large as it was last season. In some isolated areas where earlier storms occurred, and, as was the case, the flight may be of usual magnitude, but the above estimation applied chiefly to the country round the Experiment Station and Racecourse mill. Owing to the long dry season a natural check has resulted, but this does not necessarily mean that grubs will be scarce during the coming season.

Mr. R. W. Mungomery, Assistant Entomologist at Bundaberg, has furnished to the Director of Sugar Experiment Stations, Mr. H. T. Easterby, the following notes for publication, these having a bearing on grub damaged farms, which can now be seen in a few parts of the Bundaberg district:—

Notes on Grubs.

Grub damage during the past few months has been of a severe nature, several portions of the Bundaberg district having suffered through these pests. This is, no doubt, due in a large measure to the dry weather which prevailed during early spring, when grubs resumed feeding after a period either of inactivity or of lessened aggressiveness during the winter.

In winter grubs are located at deeper depths in the soil, and after their return to the upper soil levels, they begin feeding on the roots and underground portions of the stool, these serving as sources of food and moisture, both of which are necessary for their development. Consequently the cane, being in an enfeebled condition on account of the dry weather and being deprived of its roots, was doubly handicapped and the stools soon began to wilt, turn yellow, and finally die.

Q. 813 was the variety found to be most affected, and growers are advised not to plant this variety when their farms lie within the zone in which they are likely to suffer grub damage. In all cases it is preferable to substitute a deeper rooting variety, and Black Innis is one which might be grown more extensively since this cane stands up fairly well to a variety of harsh conditions.

When to Plough Out.

Ploughing out grub-infested cane should be done as soon as possible—i.e., during the hot summer months, when grubs are feeding near the surface, and all are within the reach of the plough. Their numbers are considerably lessened by the cutting and crushing effects of the discs, by sun injury, by insectivorous birds, and finally if those remaining be hand picked and destroyed the farm will be rid of a serious potential source of infestation for future years.

If this latter precaution is neglected or the block allowed to remain for some months, the grubs commence to retreat into the deeper subsoil, out of reach of the plough, and there they later change into pupae and beetles, the latter being the stage in which reproduction takes place, and so the vicious cycle commences anew.

Excessive wet conditions and cold weather both tend to send grubs downwards, and the object of the farmer should be to get these grub-eaten blocks cleaned up immediately, otherwise unfavourable weather conditions might prevent this being done.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report, dated 29th January, 1930, *from the Sugar Pathologist, Mr. A. F. Bell:—*

FIJI DISEASE.

Bundaberg District.

A fresh outbreak of this serious cane disease was discovered recently on the properties of six suppliers to the Bingera mill. In each case the infected cane was rogued or ploughed out as soon as the discovery was made, and the fields will be kept under observation by the Pathologist to the Bureau of Sugar Experiment Stations, stationed in the district.

It is well known that a cane plant may contract the disease, but on the other hand, may not show any signs of the disease for some months. For this reason it is possible that the disease exists on other farms but in a stage which could not be detected by our Pathologist, and the outbreak may be more extensive than is now supposed. All farmers in the Bingera district are warned that they should keep a continuous watch for Fiji disease, and they should be particularly careful if buying cane for plants. The varieties to be suspected are 1900 Seedling, D. 1135, New Guinea 16, and Garvan's Black. Any suspected canes should be reported at once to the Sugar Experiment Station, Bundaberg, or the Director, Bureau of Sugar Experiment Stations, Brisbane.

Moreton District.

Fiji disease was first reported from this district in 1927-28, when it was found on four farms in the Bli Bli area, in the variety H. 227. During recent inspections no sign of the disease could be found on three farms, but on the fourth the owners have neglected to carry out the simple methods of control and the disease has persisted, and is a source of danger to neighbouring farms. Two fresh outbreaks have occurred, involving two farms at Landsborough and four comparatively isolated farms at Coolum, the variety affected being D. 1135. Growers should be on the alert and watch for this disease, and any suspicious symptoms should be reported to the Director, Bureau of Sugar Experiment Stations, Brisbane.

In particular, the varieties D. 1135 and H. 227 should not be planted without a careful inspection.

Symptoms.

The main symptoms are as follows:—

1. Usually, the first symptom is the fan-like appearance of the top caused by the young leaves failing to develop properly and being short and blunt and curled inwards. The margins of these leaves often have a scalded appearance.
2. In the later stages all leaves are affected in this manner, and the stalk bears only a few stiff dwarfed leaves.
3. The short, blunt leaves are a darker green than normal healthy leaves.
4. On the back of these leaves, running along the veins, may be found small light coloured swellings or galls. These generally range from $\frac{1}{8}$ to 2 inches in length, and are usually about 1/20-inch wide. It is necessary to find these galls before one can be certain that Fiji disease is present.

Control.

1. In the first instance, care should be taken to plant cane from fields in which the disease has never been observed.
2. Uproot all diseased stools in fields in which the infection is less than, say, 5 per cent.
3. Fields in which more than 5 per cent. of the stools are infected should be ploughed out immediately after harvesting.

An account of the symptoms of the disease, together with photographs, may be found in Bulletin No. 2 of the Division of Pathology of the Bureau of Sugar Experiment Stations, which bulletin is available on application.

Fiji disease is one of the most serious diseases of sugar-cane, and twenty years ago threatened the very existence of the Fijian sugar industry.

THE FARMER AN EDUCATED MAN.

The idea that the farmer should be trained in agriculture, and little or nothing else, is part of the stupidity of the purely vocational conception of education. It might just as well be contended that the plumber should learn nothing but plumbing and the bootmaker nothing but bootmaking. Farmers need a full training of mind and character for their battle, and the relative isolation of their lives makes it especially important that they should have been taught to employ their leisure wisely. The headmaster of Christ's College makes a similar plea for an all-round foundational education for the farmer. More benefit would be derived from learning one basic scientific subject like chemistry really well than by cramming any amount of information, undigested and half-understood, on the subject of soils. But, while it is possible to do more to interest the boy in the land, it is in the main true that, as Mr. Crosse says, the chief obstacle to boys going on the land is economic. For most boys the prospects seem unpromising, and no amount of educational "bias" will overcome such reluctance.—"Auckland Star."

FIELD NOTES ON THE BANANA FRUIT-EATING CATERPILLAR (*Tiracola plagiata* Walk.).

BY J. A. WEDDELL, Assistant Entomologist.

Introductory.

During the month of March, 1927, considerable damage to cultivated bananas, maize, and other crops was occasioned by the larvae of a noctuid moth in the Southern Coastal districts of Queensland from Brisbane to Gympie, the badly affected areas including also the Kilcoy district, portion of the Brisbane Valley line, the Dayboro' district, and to a less extent the Kandanga-Amamoor area. As a result of the reports received, the writer was deputed early in March by the Chief Entomologist to investigate the outbreak in the field, and Miss Temperley to take charge in the laboratory of the living material which was collected. The information contained herein is the result of the field observations, and a subsequent article by Miss Temperley will describe the work carried out by her in the laboratory. In Miss Temperley's article will be found the descriptions of the insect's life-cycle stages and information regarding its life-history.

The insect concerned was provisionally identified from the larval characters as being *Tiracola plagiata* Walk., and this identification was subsequently confirmed by Dr. A. Jeffries Turner when specimens reared in the laboratory had reached the imaginal stage.

The attack under consideration was characterised by the fact that the insect was present in widely separated centres and was concentrated to plague dimensions in each locality, generally in and near patches of scrub or areas under weeds. Plantations or farms adjacent to such patches suffered severe damage; in a few of the banana plantations all fruit was damaged, and numbers of banana-growers lost approximately one-third to one-half of the season's crop. Maize and pumpkins particularly, and other crops growing in the affected areas also were badly damaged.

Synonymy.

The moth is now known as *Tiracola plagiata* Walk., but records of its occurrence have been made under the following names which are regarded as synonyms. *Arcilasisa plagiata* Walk., *Agrotis plagifera* Walk., *A. spectabilis* Walk., *A. plagiata* Walk., *A. grandirena* Herr Schäff. In searching the literature it was found that the generic name *Arcilasisa* has also been variously spelt *Arcilasia* and *Arcilisia*.

Previous History of the Insect in Queensland.

The insect has previously been associated with the banana plant as an occasional fruit pest; the records of the Entomological Branch show that it was received from Currumbin (4th June, 1916, and 7th August, 1917), Gympie (17th June, 1919), Montville (29th Oct., 1926), and Buderim (11th November, 1926), with bananas in each case the principal host; also the adult was reared from a caterpillar collected by Mr. Henry Tryon in a Stanthorpe orchard in 1895 or 1896. Tryon[17] also recorded the insect as a leaf-eating caterpillar on mulberry at Brisbane during the Departmental year 1914-1915.

The records further show that the specimens received from Gympie (17th June, 1919) were sent to illustrate an outbreak that was comparable, apparently, in both the amount of damage and the extent of area affected, with that now under consideration. On that occasion the whole of the Gympie area—Brooloo, Kandanga, Amamoor, Lagoon Pocket, Corella, Chatsworth, and Traveston—was reported to be badly infested by the late Mr. James Mitchell, Assistant Instructor in Fruit Culture. Banana-growers in the area suffered serious losses, and Mr. Mitchell stated that the caterpillars were feeding also on maize, papaws, garden peas, bush shrubs, trees, grass, *Sida retusa*, and pigweed, and he referred to "this destructive pest which is attacking everything green, foliage and fruit."

Mr. J. L. Froggatt has recorded in Departmental Reports the presence of the insect on bananas at Cardwell (September, 1925), Babinda (September, 1925), Innisfail (October, 1926, September and October, 1927), and Byfield (October, 1927).

Occurrence in Other Countries.

The insect was recorded by Hampson[11] as having been collected in Mexico, Cuba, Paraguay, Western China, Sikhim, Bombay, Canara, Ceylon, Singapore, Borneo, Java, New Guinea, Queensland, New South Wales (Sydney), Tahiti, Marquesas (Nuka-Hiva).

A summary is given in Table I. of such host plant records of overseas occurrence as it was possible for the writer to discover. It is interesting to find that Corbett[3] stated that the insect is a pest of cassava, coffee, and rubber in Malaya, and that it migrates from waste lands. Palm[14] also recorded that the insect defoliated "woods" of *Trema amboinensis* and then attacked seed beds and newly-planted tobacco.

De Bussy[4] mentioned in 1915 that the noctuid *Arcilisia plagiata* seemed to have almost disappeared in recent years; it is interesting to note the parallel in Queensland during the intervening years from 1919 to 1927.

In Mededeelingen van het Deli Proefstation[13] it was mentioned that the chalcidid egg parasite, *Trichogramma pretiosa* Riley, had been found infesting the eggs of *Tiracola plagiata* Walk., among other species, which were all spoken of as being well known pests of local crops.

De Jong[5] reported that in one plantation the caterpillars of *Tiracola* (*Arcilasisa*) *plagiata* Walk. severely injured the leaves and bark of young *Hevea*, the infestation being due to the normal food-plant, *Ballota*, being completely defoliated.

Cultivated Host Plants in Queensland.

A list of the cultivated plants that were found to be attacked during the 1927 outbreak is given in Table II. Rather full notes of the nature of the injury to three of these—banana, maize, and pumpkin—that suffered most severely are given in following paragraphs. It might, however, be noted here that the fruit as well as the foliage of the tomato was attacked; also that the record of the pear being attacked referred to one small tree.

It must be understood that the three principal hosts probably were so because of the comparatively large area of each. In places the other plants listed in the table were practically defoliated, and it would appear that a large area also of any of them would have been badly attacked had such an area been available.

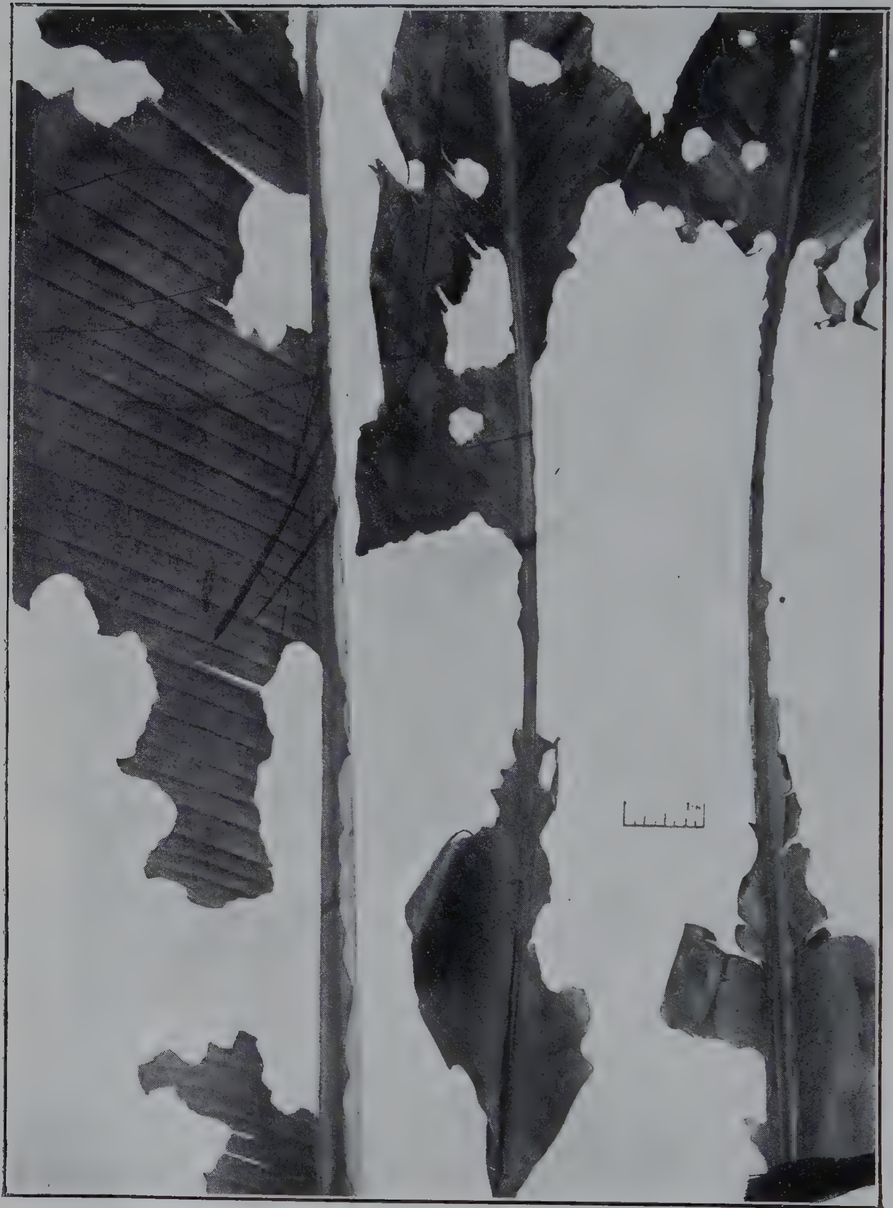

PLATE 62.—YOUNG LEAVES DAMAGED BY BANANA FRUIT-EATING CATERPILLARS (*Tiracola plagiata* Walk.)

Injury on the Banana.

The larvæ fed on both the foliage and the fruit of the banana, but the damage to the foliage, even where most common, was of little economic importance. The injury was of three types: (*a*) Feeding on the surface of either the leaves or the fruit by the young larvæ; (*b*) eating holes in the leaves by all except the very young larvæ; (*c*) burrowing into the pulp of the fruit by the more mature larvæ.

The damage to the epidermis of the leaves was caused by the young larvæ not more than half an inch in length, and it took place along the edges of the midrib on either the upper or the lower surface. When older the larvæ were able to eat holes in the leaves, and in extreme cases they left very little more than the midribs of young leaves (see Plate 62). Apparently the larvæ either continued to feed on the foliage or crawled by chance to a bunch of fruit to feed there.

The primary, and actually the most extensive, damage that the larvæ caused to the fruit was the eating or eroding of the skin, one larva being able to render unsightly quite a number of the fruit on a bunch; the affected area at first appeared a paler green, but it quickly darkened and became a brown scar (see Plate 63). It was this type of damage that occasioned most of the losses, for, although the other type of damage to the fruit is perhaps more striking, there is the advantage that when a larva burrows through the skin it is satisfied then with the pulp of perhaps only one fruit.

Banana fruit in all stages of development from the time when the bracts lifted right up to the ripening stage was liable to injury to the surface skin by the younger larvæ, but the more mature larvæ burrowed into the pulp only when the fruit was well filled (see Plate 64).

It was particularly noticeable that the larvæ preferred to work in a bright light, for the upper and outward portions of the fingers were those that were first and most severely affected, and many bunches were seen in which the only fingers free from damage were those on the shaded portion of the bunch.

Injury on Maize.

One area of maize, 50 acres in extent, was examined near Kilcoy, and this proved to be fairly uniformly and badly infested by the insect. Larvæ were present on all parts of the plants, and they had damaged both the foliage and the grain. Practically every cob was affected; the silks of the cobs were eaten, and the larvæ had both followed down into the grain, and also apparently eaten through the bracts. In this way, besides the actually damaged grain, there was the possibility of further loss due to rotting consequent on the partial exposure of the developing seed.

Injury on Pumpkin.

Pumpkin vines were growing between the rows of the maize mentioned above. The vines were practically defoliated, and all the fruit was very badly damaged. Inconceivable as it may appear, the larvæ had eaten large patches of the tough rind of the pumpkin, and then had burrowed into the pulp. The least damaged of the pumpkins present had lost approximately one-half of the rind, and in the extreme cases only a heap of frass served to indicate where a fruit had been, even the seeds having been eaten.

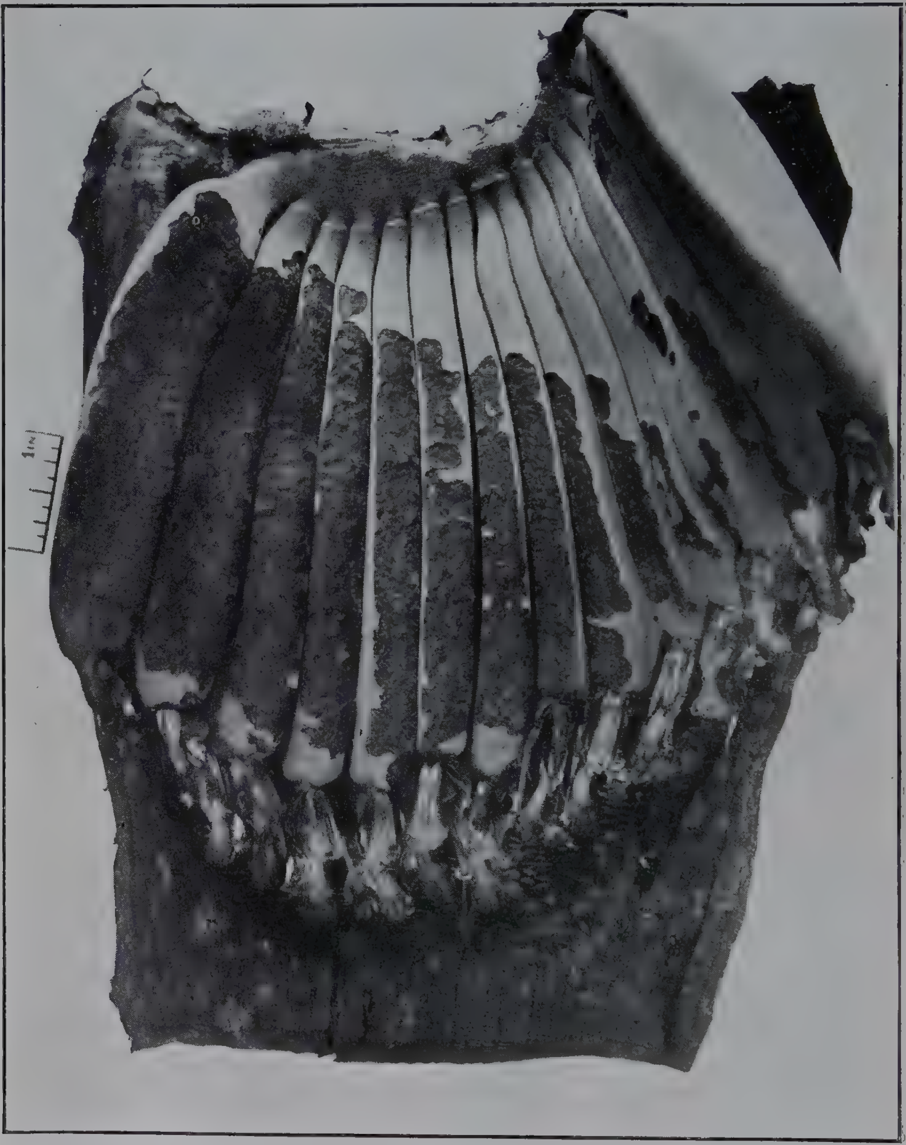

PLATE 63.—YOUNG FRUIT SHOWING SKIN EROSION BY BANANA FRUIT-EATING CATERPILLARS (*Tiracola plagiata* Walk.).

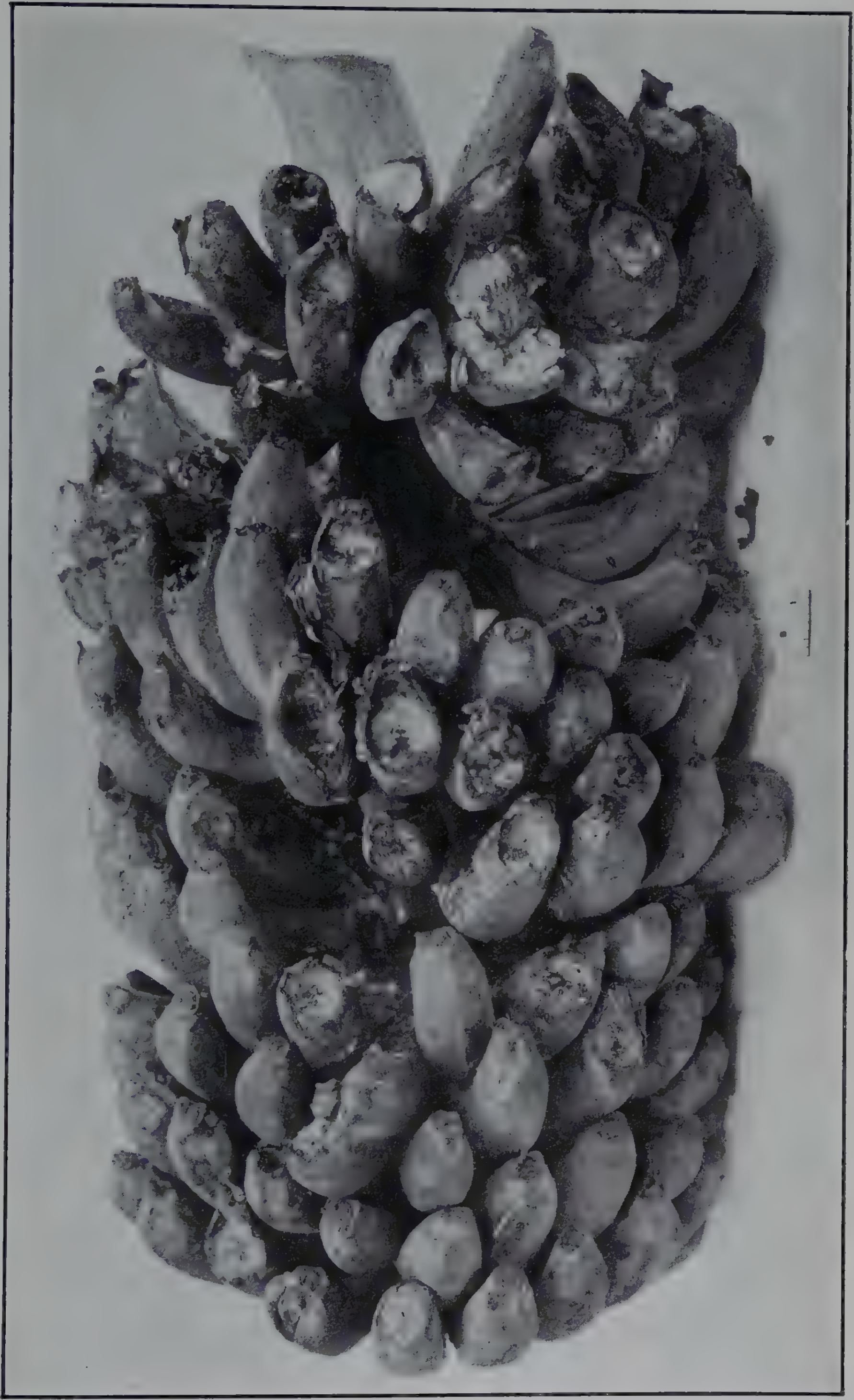

Plate 64.—Bunch showing damage by Mature Banana Fruit-eating Caterpillars (*Tiracola plagiata* Walk.).

Other Host Plants in Queensland.

A list is given in Table III. of the weeds, scrub plants, and trees that were found to be attacked by *T. plagiata* during the outbreak under discussion. Of these, firstly the inkweed *Phytolacca octandra,* and secondly the white passionfruit *Passiflora alba* were affected most heavily.

Where the insect occurred in numbers the inkweed was almost completely eaten down, only bare stalks about 12 in. long remained (see Plate 65), and the patches had the appearance of having been "brushed" recently. At one place also a large area of lantana, several acres in extent, had in turn been overgrown by the white passion vines; these vines were found to be almost defoliated.

A glance through this and the previous lists will show that the insect has a surprisingly wide range of food-plants. It includes in its dietary representatives of many natural orders, and among them are plants such as the Scotch thistle, lantana, and the poison peach. The lists serve to show that practically no cultivated plant can be regarded as being safe from attack.

Sites of Oviposition in the Field.

Eggs of the insect were found in the field at Harlin, Brisbane Valley line, in May, 1927. They were found generally singly on the leaves of inkweed, the upper and under surfaces being equally favoured; one case occurred where one egg was superimposed on another. A total of twenty eggs was found, and in the laboratory fourteen of these hatched, but, unfortunately, the larvæ died in the first instar.

A number of very young larvæ of *T. plagiata* were also found feeding on the inkweed, and these were subsequently reared to the adult stage.

It cannot be stated that eggs are not laid on the banana, but from the above and other information it is probable that inkweed is the important primary host.

Migratory Habit of the Caterpillars.

Very little definite information could be obtained regarding the migratory habit of the caterpillars, but they certainly wandered from one plant to another.

One farmer first noticed the insect feeding on some inkweed growing adjacent to his bananas. A few days later he discovered that the caterpillars were infesting several rows of bananas, and the inkweed was by then almost non-existent. Later the caterpillars were found to be spread thickly over a large area of the plantation, and elsewhere were noticeable in smaller numbers, but the bananas nearest to the inkweed remained the most severely infested.

In areas where the insect occurred in numbers caterpillars were found on the ground, on the trunks of trees, on the stems of herbaceous plants, feeding on the foliage, and also moving or resting on the posts and wires of fences.

The caterpillars retained a grip on smooth surfaces by laying down a very fine webbing. The younger larvæ made use of their ability to spin to provide safety lines when they fell or were disturbed; numbers of young larvæ could be seen at times suspended from silk threads a foot or two in length.

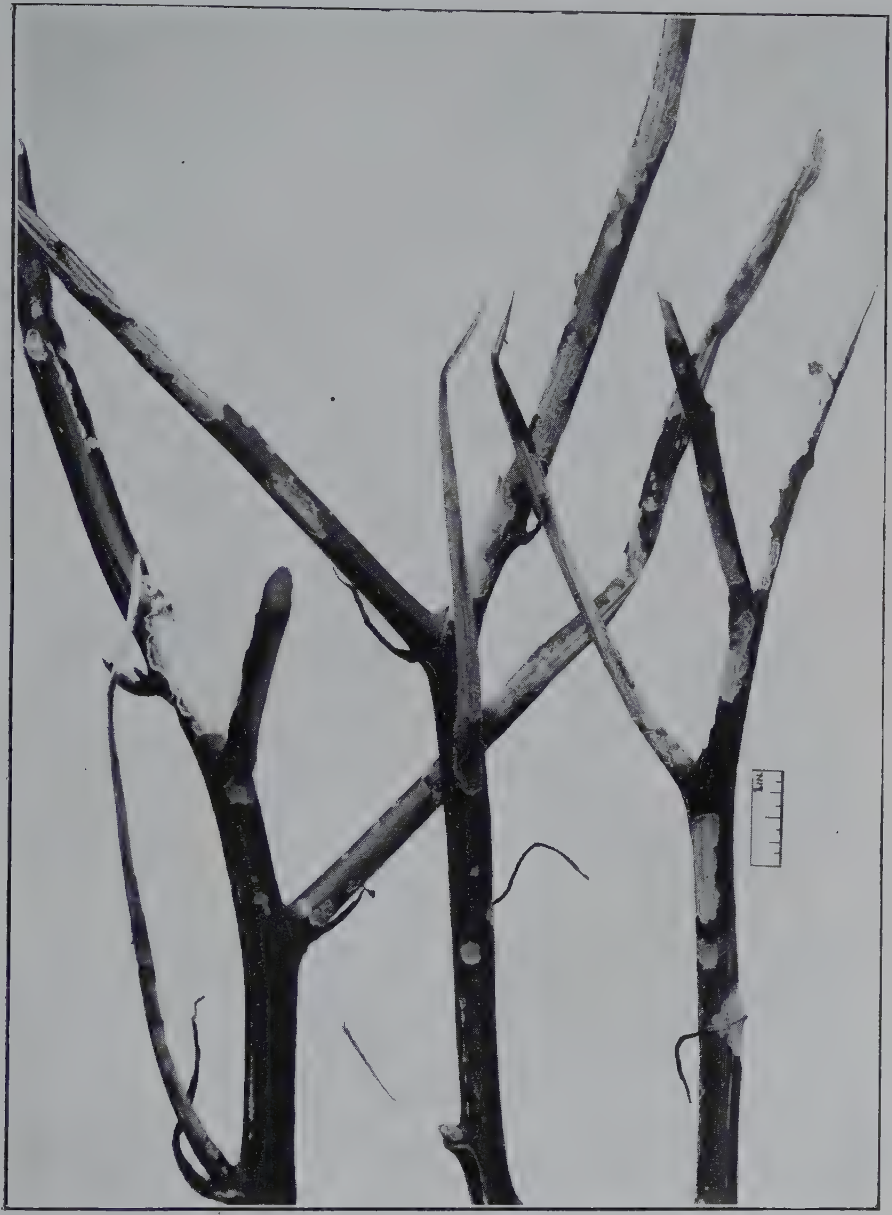

Plate 65.—Inkweed (*Phytolacca octandra*) damaged by Banana Fruit-eating Caterpillars (*Tiracola plagiata* Walk).

Pupae and Adults in the Field.

In the field the pupæ were invariably encased in earthen cocoons, and were found an inch or two below the surface of the soil, often also partly sheltered by a loose stone, stick, or log. At no time during the investigations was the adult moth seen in the field by the writer.

Natural Control.

In the maize crop abovementioned, a number of ichneumonid wasps were seen flying, and at times they darted towards groups of larvæ either on the ground or on the plants, but no record was made of an actual attempt to parasitise.

However, a number of hymenopterous larvæ and pupæ were found 1 or 2 in. under the soil in the same situations as the pupæ of *T. plagiata*, and in some instances actually encased in the typical earthen cocoon of the moth. These were forwarded to Brisbane, where among other species a number of individuals of *Paniscus testaceous* Grav. reached the adult stage.

A factor of natural control must be responsible for holding the pest in check during those years in which it does not appear in large numbers. Just what this factor is it is at this stage impossible to state, but there is the possibility that egg parasites may be the cause. If then conditions, climatic and other, were to become unsuitable for the egg parasites, the host might be enabled to breed up to pest proportions for the time being.

Artificial Control.

Several possible methods of artificial control suggested themselves, and of these, three methods were given preliminary trials. Unfortunately, these trials could not be followed by the larger and more detailed experiments, such as are necessary before control measures can be recommended with certainty, owing to the rapidity with which the pest manifested itself and then disappeared, and also because of inclement weather during the period. Still, as will be seen below, a certain measure of success was obtained, and the results mentioned will serve as a basis for further experiments when the opportunity offers. The methods of control tried were dusting, baiting, and covering the bunches.

Dusting.

It was found to be practically impossible to dust the foliage effectively on account of the smooth nature of the surface; the dust lay on any fairly horizontal upper surface, but acutely inclined leaves and the under surface of all the foliage retained little poison. Most of the dust cloud, indeed, was carried away and dispersed by the wind, and it must be remembered that a considerable movement of air is usually associated with slopes such as are used for banana cultivation in Southern Queensland. To compensate for all of these adverse factors a heavier dusting was given than should otherwise have been necessary.

The dusting was carried out on a young plantation, the foliage of which was fairly heavily infested considering the size of the plants. Two dusts were used, both being applied with a small hand dust gun.

Eight young plants containing a total of fifty-three caterpillars at the beginning of the experiment were dusted with a mixture of one part of arsenate of lead and five parts of hydrate of lime on 14th March, 1927. On 16th March the plants were examined, and three to five living caterpillars were found on each; the foliage showed fresh damage, both where the poison dust had fallen and also where the surface appeared clean. No dead caterpillars were found actually on the plants, but a total of sixteen dead and four living caterpillars were found on the ground.

On 17th March the plants were again examined, and from three to five larvæ were still present alive on the plants, eleven dead, and four living caterpillars were found on the ground. (For details see Table V.)

It will be seen that on 17th March thirty-seven caterpillars remained alive and a total of twenty-seven dead had been found, making a total of at least sixty-four caterpillars known to have been in the area during the test. The kill represents 42 per cent., but owing to the migration of the caterpillars this percentage is only very approximate.

Eight young plants containing caterpillars were dusted on 14th March with "Killdust." The subsequent condition of the area was much the same as with the arsenate of lead mixture. The details are given in Table VI., where it will be seen that twenty-one caterpillars were killed out of an accountable population of sixty-one—that is, 34 per cent. Here again the percentage kill is unreliable, for just as fresh caterpillars entered the area during the experiment a number quite probably crawled away elsewhere to die.

Baiting.

A Paris green bait was used for this experiment, made up in the following proportions:—

Paris green	1 lb.
Bran	50 lb.
Molasses or treacle	1 qt.
Juice from	2 oranges.
Water, about	2 gallons.

The Paris green and bran were mixed together dry; the molasses, orange juice and a quantity of the water were then mixed, and stirred into the bran. More water as required was then added to bring the whole to a moist but still loose consistency.

Sufficient bran was obtainable at the time to treat only a few stools, and ten stools were baited on 16th March. These stools, which were in full bearing, were very heavily infested by the pest, there being an estimated total of from sixty to one hundred caterpillars to each stool.

The bran was applied by scattering broadcast, about three handfuls being thrown on the ground surrounding each stool, and one to two handfuls were scattered sharply into the foliage. Distributed in this way the full mixture mentioned above should cover about half an acre.

A number of caterpillars were noticed to be attracted immediately to the bait, leaving the portion of leaf on which they were feeding and moving to pieces of bait that had fallen nearby. Some that were migrating over the ground appeared to deviate in order to feed on chance pieces of bait.

Examination of the patch on 17th March revealed that a large number of larvæ had been killed, estimated at 66 per cent. of the population, and these were present on the ground, in the foliage, and on the bunches. Those on the ground were generally grouped in sheltered spots, and the others were usually hanging limply by their caudal prolegs from a rough edge such as a torn patch of leaf or the flower end of a fruit. The population of one stool was counted, and the results are given in Table VII.

Half a dozen larvæ from half to full grown were confined in tubes with some of the poison bran bait at 2 p.m. 16th March; at 10 p.m. they were still alive, but less active than at 2 p.m.; by 7.0 a.m. 17th March all were dead.

Covering the Bunches.

This method, strictly speaking, is not a means of control of the insect, but it should prove useful from the point of view of reducing the amount of damage by directly protecting the fruit. The material used was a kind of cheesecloth woven in tubular form, known as "Joycenet," being manufactured by Joyce Bros., Brisbane. It may be purchased in 100-yard lengths and cut up as required, or at a little increased cost it is obtainable cut into lengths with the bottom sewn up, being then known as "Joycenet envelopes."

In using the cloth from a roll it is only necessary to pull the material up over the bunch and to tie it with string around the stalk above and below the fruit, and to cut off the remaining material from below; the fruit in this way is completely encased.

The point needing testing in this particular instance was whether or not the caterpillars would penetrate the material. Two bunches, after being examined to ensure that they were free from caterpillars, were covered with "Joycenet," and in each instance twelve caterpillars, representing as nearly as possible all stages of development, were placed on the outside. They made no attempt to penetrate, and merely walked over the covering. Examination on the following morning revealed the fact that no larvæ remained on one cover, and only one larva was on the other, with two larvæ on the exposed end of the bunch stalk. There were no marks of attempted penetration, and no larvæ were found within the covers.

The cost of the material is not high; it is understood to be about 25s. per 100 yards—i.e., 3d. per yard.

About five minutes was taken to examine and cover each bunch, but with practice this time could be reduced.

	d.
1⅓ yards at 3d. per yard	4
5 minutes at 2s. per hour	2
	6d. per bunch.

It seems reasonable to advise that in the event of another outbreak of this pest being noticed in time, the banana-growers should immediately cover at least the "special" and "choice" bunches in the plantations, and possibly extend the operation to include all the bunches that up to that stage have not been attacked.

Provisional Recommendations for Control.

As it seems evident that the outbreak commenced and increased in and near scrub areas, and in particular in the inkweed, it is recommended that a strip of ground be kept clean between the planted areas and nearby scrub, and, of course, that the areas themselves should be cleanly cultivated.

The farmer should examine the scrub at times, paying attention to any inkweed that may be nearby, as he may thus be forewarned against another attack. If the caterpillars should be seen to be at all prevalent, then the farmer should immediately scatter poison bran bait along the cleared strip mentioned, and also over at least several adjacent rows of bananas. Should the caterpillars spread into the farm, it would then be as well to bait the whole area, scattering the bran more thickly near the scrub. Consideration might also be given to the covering of the bunches as described.

The use of dusting is not recommended at this stage owing to the difficulties of application previously mentioned.

Acknowledgements.

The writer desires to express thanks to those farmers in various localities who allowed him access to their plantations and farms, and in particular to Mr. C. R. Nunn, Winya, Kilcoy line, for information and help, and on whose property a large amount of the foregoing work was done. Thanks are also due to Mr. C. T. White, Government Botanist, for the identification of certain of the plant material, thus making possible the compilation of the list of native hosts.

TABLE I.

OVERSEAS RECORDS OF OCCURRENCE OF *Tiracola plagiata* Walk.

Country.	Host Plant.		Recorded by
	Common Name.	Botanical Name.	
Ceylon	Brinjal or Egg Plant	*Solanum melongena* Linn.	Hutson[12]
	Tea	*Camellia theifera* Dyer	Department of Agriculture, Ceylon[2]
	..	*Erythrina lithosperma* Bl.	
	Plantain	*Musa* sp.	
	Lima Bean	*Phaseolus lunatus* Linn.	
	French or Kidney Bean	*Phaseolus vulgaris* Linn.	
Malaya	Castor Oil	*Ricinus communis* Linn.	Department of Agriculture, Malaya[6]
	Castor Oil	*Ricinus communis* Linn.	Gater[8]
	Castor Oil	*Ricinus communis* Linn.	Susainathan[16]
	Lime	*Citrus Medica* Linn., var. *acida*	Gater[8]
	Tapioca	*Manihot utilissima* Pohl.	
	Para-rubber	*Hevea brasiliensis* Muell.-Arg.	
	Banana	*Musa* spp.	
	..	*Melastroma polyanthum*	
	Cassava	*Manihot* spp.	Corbett[3]
	Coffee	*Coffea arabica* Linn.	
	Rubber	*Hevea brasiliensis* Muell.-Arg.	
Dutch East Indies	..	*Ballota* sp.	de Jong[5]
	Tobacco	*Nicotiana* sp.	van Hall[9]
	Tobacco	*Nicotiana* sp.	Palm[14]
	..	*Trema amboinensis*	
India	..	*Emilia* sp.	Hampson[10]
	Tea	*Camellia theifera* Dyer	Andrews[1]
Formosa	Tea	*Camellia theifera* Dyer	Shiraki[15]

TABLE II.

CULTIVATED HOST PLANTS OF *Tiracola plagiata* Walk. IN QUEENSLAND DURING THE 1927 OUTBREAK.

Family.	Genus and Species.	Common Name.
Musaceæ	*Musa* spp.	Banana
Gramineæ	*Zea mais* Linn.	Maize
Cucurbitaceæ	*Cucurbita Pepo* Linn.	Pumpkin
Cucurbitaceæ	*Citrullus vulgaris* Schrad.	Watermelon
Cruciferæ	*Brassica oleracea* Linn.	Cabbage
Cruciferæ	*Brassica oleracea* Linn. var.	Cauliflower
Solanaceæ	*Lycopersicum esculentum* Mill.	Tomato
Solanaceæ	*Physalis peruviana* Linn.	Cape Gooseberry
Passifloraceæ	*Passiflora edulis* Sims.	Passion Fruit
Chenopodiaceæ	*Beta vulgaris* Linn.	Beetroot
Leguminosæ	*Phaseolis vulgaris* Linn.	French Bean
Caricaceæ	*Carica papaya* Linn.	Papaw
Rosaceæ	*Pyrus communis* Linn.	Pear

TABLE III.

WEEDS, SCRUB PLANTS, AND TREES THAT WREE DAMAGED BY *Tiracola plagiata* Walk. IN QUEENSLAND DURING THE 1927 OUTBREAK.

Family.	Genus and Species.	Common Name.
Portulaceæ	*Portulaca oleracea* Linn.	Pigweed
Tiliaceæ	*Sloanea australis* F.v.M.	..
Rhamneæ	*Alphitonia excelsa* Reissek.	Red Ash
Sapindaceæ	*Harpullia pendula* Planch	Tulipwood
Myrtaceæ	*Eucalyptus* sp.	..
Passifloreæ	*Passiflora alba* L. & O.	White Passion Fruit
Cucurbitaceæ	*Bryonia laciniosa* Linn.	Native Bryony
Compositæ	*Bidens pilosa* Linn.	Cobbler's Pegs
Compositæ	*Tagetes glandulifera* Sch.	Stinking Rodger
Compositæ	*Sonchus oleraceus* Linn.	Milk Thistle
Compositæ	*Cnicus lanceolatus* Hoffm.	Scotch Thistle
Solanaceæ	*Solanum nigrum* Linn.	Black Currant
Solanaceæ	*Solanum auriculatum* Ait.	A "Wild Tobacco"
Solanaceæ	*Solanum verbascifolium* Ait.	"Wild Tobacco"
Solanaceæ	*Physalis minima* Linn.	Wild Gooseberry
Solanaceæ	*Nicotiana suaveolens* Lehm.	A "Wild Tobacco"
Verbenaceæ	*Lantana camara* Linn.	Lantana
Amarantaceæ	*Amarantus viridis* Linn.	..
Phytolaccaceæ	*Phytolacca octandra* Linn.	Inkweed
Monimiaceæ	*Kibara macrophylla* Benth.	..
Euphorbiaceæ	*Mallotus philippinensis* Muell.-Arg.	Kamela Tree
Urticaceæ	*Trema aspera* Bl.	Peach-leafed Poison Bush, or Poison Peach
Urticaceæ	*Pseudomorus Brunoniana* Bur.	..
Commelinaceæ	*Pollia macrophylla* Benth.	..
Aroideæ	*Alocasia macrorrhiza* Sch.	Cunjevoi.

TABLE IV.

SYNOPSIS OF HOST-PLANT RECORDS.

	Species.
Recorded Overseas (Table I)	18
Cultivated Host-Plants in Queensland recorded in 1927 (Table II.)	13
Other Host-Plants in Queensland recorded in 1927 (Table III.)	25
Cultivated Host-Plants in Queensland previously recorded (not included in Table II.)*	1
Other Host-Plants in Queensland previously recorded (not included in Table III.)§	1
	58
Number of instances in which overlapping occurred between Tables I. and II. (Bananas and French Beans)	2
Total number of Host-Plants recorded	56

* Mulberry, *Morus* sp., fam. Moraceæ, recorded by Tryon.[17]

§ *Sida rhombifolia* Linn. (= *retusa*) fam. Malvaceæ, recorded by Mitchell (see p. 187).

TABLE V.

RESULTS OF DUSTING WITH THE FOLLOWING MIXTURE:—ONE-PART ARSENATE OF LEAD, FIVE-PARTS HYDRATE OF LIME.

<table>
<tr><th rowspan="2">Plant.</th><th colspan="3">Number of Caterpillars found on—</th></tr>
<tr><th>14th March, 1927.</th><th>16th March, 1927.</th><th>17th March, 1927.</th></tr>
<tr><td>A</td><td>4</td><td>3</td><td>3</td></tr>
<tr><td>B</td><td>6</td><td>5</td><td>4</td></tr>
<tr><td>C</td><td>8</td><td>5</td><td>5</td></tr>
<tr><td>D</td><td>6</td><td>5</td><td>5</td></tr>
<tr><td>E</td><td>6</td><td>4</td><td>5</td></tr>
<tr><td>F</td><td>9</td><td>5</td><td>4</td></tr>
<tr><td>G</td><td>6</td><td>4</td><td>4</td></tr>
<tr><td>H</td><td>8</td><td>4</td><td>3</td></tr>
<tr><td>Total alive on Plants</td><td>53</td><td>35</td><td>33</td></tr>
<tr><td>Alive on Ground</td><td>*</td><td>4</td><td>4</td></tr>
<tr><td>Total alive in the Area</td><td>..</td><td>39</td><td>37</td></tr>
<tr><td>Dead on Ground</td><td>*</td><td>16</td><td>11</td></tr>
<tr><td></td><td></td><td colspan="2">27</td></tr>
</table>

* Not observed.

The nearest approximation to the number of larvæ that came under the influence of the test is found by adding the total number alive on 17th March to the total number found dead—i.e., 37 + 27 = 64. Therefore, 27 out of 64 died—i.e., a kill of 42 per cent. This result must be understood to be only very approximate owing to the wandering of the larvæ, both into and away from the experimental area.

TABLE VI.

RESULTS OF DUSTING WITH "KILLDUST."

Plant.	Number of Caterpillars found on—		
	14th March, 1927.	16th March, 1927.	17th March, 1927.
I	6	5	5
J	6	6	5
K	5	4	3
L	7	4	4
M	6	3	2
N	6	4	3
O	7	6	5
P	8	5	6
Total alive on Plants	51	37	33
Alive on Ground	*	8	7
Total alive in Area	..	45	40
Dead on Ground	*	11	10
		21	

* Not observed.

As in the previous table, the total number of insects under consideration will be taken as the sum of those alive on 17th March, + total found dead—i.e., 40 + 21 = 61. Therefore, 21 died out of 61—i.e., 34 per cent. This result similarly is only very approximate.

TABLE VII.

LARVAL POPULATION OF ONE BANANA STOOL TWENTY-FOUR HOURS AFTER USING PARIS GREEN BRAN BAIT.

Situation.	Alive.	Dead.
On the Ground	5	17
In the Foliage	9	26
On the Fruit	13	3
Totals	27	46
	73	

Forty-six dead from a total of seventy-three represents 63 per cent.

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ECONOMY AND COMMON SENSE.

Any honest doctor, finding that his treatment had harmful instead of beneficial effects, and seeing that his patient became worse instead of better, would not hesitate for a moment to reconsider his original interpretation of symptoms. Neither would he be content merely to maintain strength, or temporarily to heal sores. Rather would he aim at a proper understanding of causes in order that he might, by removing these, pave the way to complete recovery. Similar procedure should be adopted where disease is economic and affects the body politic instead of the body physical, especially so when it prejudicially affects the whole nation.

The economic practitioner has to deal with psychological obsessions which, originating in the individual, frequently flame into mass demands of varying and sometimes questionable utility and possibility. His problem, too, is complicated by the fact that in democratic countries political power lies with those who are easily encouraged to demand but who have little apprehension of the eventual consequences of unwise exaction.

The task of the economist, and for all of us, particularly for those in the trade union movement, is not to waste time in apportioning blame, but to devote time and talents to ascertaining causes and providing remedies which at least replace the wealth expended upon their provision. The practice of giving money for nothing, whether in the form of subsidies or uncovenanted benefits, and of undertaking relief works of which the ultimate value is less than the current expenditure, must leave the community progressively poorer, and involve an eventual poverty which none may contemplate without terror.—Mr. W. A. Appleton, secretary of the General Federation of Trade Unions, in his quarterly report with reference to unemployment.

RURAL LIFE IN OTHER LANDS—X.

By the EDITOR.*

BYWAYS IN BELGIUM.

In our hurried journey through Holland we got back to the province of Limburg and its highly aromatic cheese, and where specialised agriculture is supplanted by secondary industries for which local extensive coal measures are largely drawn upon.

Talking of specialised farming one is reminded that, like France and Denmark, Holland's present position as a primary producing country is due to a serious agricultural crisis that developed at the time when her markets were swamped with grain from newer wheat-growing countries oversea. Facing the facts as they were, the Dutch farmer, like his Danish neighbours, realised that to hold his own in world competition he had to develop a system of intensive culture of special crops, based on modern scientific and technical principles. So he studied his country's possibilities and peculiarities, and shaped his plans accordingly. In some districts he concentrated on grazing—cattle raising, not for the butcher, but for the production of butter and cheese. In other provinces he bent his efforts towards cropping for special products, which involved no particular perishable risk, and for which he had ready markets. He knew, for instance, that the limitations of his land were against successful competition in grain production with farmers on the Australian plain lands or the Canadian prairies. The results of his long-headedness are evident in the stability of his specialised industries to-day. They also supply a moral for farmers in other countries.

A Great People.

In marketing the Dutch farmer is wide awake, and he enjoys the advantage of a highly-organised system. Co-operation is well established. Economic time-saving systems have been evolved, and generally, under their auction sales system, it takes no more than about five minutes to sell a barge load of produce.

Benevolent paternalism is evident in all Government activities, but it is doubtful if the Queensland farmer, with his intenser individualism, would submit to the same degree of regimentation.

Education is widespread, and the social status of the teacher is on a high plane. Rural social life is centred in picturesque villages. In the towns industry is well regulated, and comprehensive laws relating to housing, factory management, and juvenile labour are in force.

Altogether, Holland is a prosperous and progressive country, even if, from an Australian point of view, like other old world lands, she is overweighted with custom, tradition, and puzzling social anachronisms.

The Dutch are a great people, as their history shows, and between Holland and Australia there is a direct relationship—distance-dimmed and shadowy, perhaps, yet quite evident as the map of Australia reveals with physical features, from the Gulf of Carpentaria in the North, Dirk Hartog and Rottnest in the West, and Tasmania in the South, named by early Dutch navigators—Tasman, who discovered Tasmania (he called it Van Diemen's Land) and gave his name to the Tasman Sea, and others of almost equal note.

Back to Belgium.

Returning across the German frontier on the road to Aix-la-Chapelle—the Germans call it Aachen—one was not without regret for not being able to see more of Holland, more of its people, of its systems of rural organisation, its remarkable monuments to human engineering genius and character, its quaint mediæval cities from Groningen down to Maestricht, and its bewildering maze of barge-burdened waterways with their long, straight lines of sheltering poplars "marching against the sky."

Recrossing the Belgian border we were in familiar country again along a road that saw the passing of the invading German army in 1914. Halting at historic Liege with its beautiful bridge, the Pont de Fragnee, its frowning citadel, its old church of St. Martin, and its bisecting ribbon of dull beaten silver—the beautiful river Meuse—we paid tribute to the memory of its heroic defenders.

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*In a Radio Address from 4QG.

Taking a roundabout course we passed through Quatre Bras and across the field of Waterloo, with its pyramidal memorial mound—the head of its surmounting lion now turned towards Germany—on the road to Brussels. Flush with the tree-lined road was the farm of La Belle Alliance which you will remember was the centre of the French line on the day of the historic battle. Surveying the peaceful scene from the crest of the mound with the white walls of La Belle Alliance marking the way we had come, we looked across fields of waving grain and furrrowed soil to La Haye Sainte and to other historic landmarks which became immortal on that June day more than a century ago. Recent memories had dissipated all desire to delay too long on battlefields, ancient or modern, but looking out over cultivated fields that once had trembled to the thunder of the guns, down along cobbled roads that once had echoed and re-echoed to the tread of marching armies, and visualising the tragedy of it all, it was hard to resist moralising on the effective artistry of Nature in camouflaging so completely all the ugliness of war.

Where Man has Beaten Nature.

Belgium is another interesting country. In other lands man has been changed by Nature; in Belgium, as in Holland, man has beaten Nature. One's first impression of Belgium in peace time is that of a human meat-ant's nest. No other country in the world, perhaps, is populated so densely, more so even than China. Its 11,000 square miles—the size of a North Australian cattle station—carry just on 8,000,000 of people, and there is scarcely a variety of occupation they do not engage in. About half of the people live by farming and related activities.

Industrial production is equally intensive, and round about Charleroi, which is a coal-mining centre well remembered by men of the A.I.F., one was to see the extraordinary sight of women and girls working as miners on a daily wage. One had got used to women in farm field work, but to see them working coal skips was a new experience.

Charleroi is the centre of a canal system connected directly with the similar systems of Germany, Holland, and Northern France, and it is no uncommon sight to see whole families yoked up in harness towing deeply-laden barges along the waterways.

Dog Power an Economic Factor.

Talking of man power in transport reminds one of the use of dog power in Flanders and neighbouring territories. On the farm dog power is quite an economic factor; and it is utilised to turn separators, operate sewing machines, butter churns, chaff cutters, and other mechanical contrivances.

The principle employed is similar to that of a treadmill. A wheel with treads is mounted on a shafting, from which various gears, belt-driven, connect with the machine to be worked. The dog, which is well-broken to the job, hops into the boxed-in wheel and goes for the lick of his life on a seemingly never-ending Marathon. He remains, of course, in the one spot, his energy turning the wheel, which in turn propels the belt which operates the machine. The dog goes on tirelessly, and one's first thought is of its cruelty. That is not so apparent, however, when you learn that the job is done in shifts. Usually two dogs are employed. Each seems to know to the second when his shift is ended. When that happens the hound starts to yelp and howl, back-pedalling all the time, and then, so to speak, sits down in the breeching, holds a stopwork meeting with himself, checks with his weight the turning of the wheel, and then goes on strike. When the wheel stops he hops out, and his mate takes his place to repeat the same performance until the service is no longer required by the farmer.

Dogs are also used as draught animals, particularly in milk distribution. Sometimes the dog is yoked up in shafts, and sometimes he is harnessed to the axle, the vendor holding the shafts while the dog does the pulling. At times the dogs would feel the call of the wild or enter into the spirit of the chase with a cat as a fleeting objective, and then there would be a scatter of milk and cream cans and much vehement language from the driver. I remember once at a place called Abeele when in the railway yard a mob of dogcarts came in with their loads of milk for delivery. A kindly Digger tossed half a tin of bully beef in amongst the "mongs." The mixup and spilt milk that followed nearly led to international complications, and only the timely arrival of a town picket saved a declaration of another little war on the spot.

These dogs, which are often of no particular ancestry, are very intelligent, and, like the pack camel, know exactly what is a fair thing. If a dog is overloaded or worked beyond his set time he promptly holds a stopwork meeting and "declares his attitude" in his loudest yelps.

Community Service.

A growing practice I noticed among village communities in Belgium—it was an outgrowth of war-time conditions, I believe—was evident in a sort of general community service. When crops were to be harvested all the people of the village turned out. Each crop in turn was harvested by all hands until the whole district produce had been gathered into the barns. No wages were paid, but each farmer supplied food, refreshment, and entertainment to the field workers while they were engaged on his holding. No one was exempt from this community service. When each crop was harvested, all hands moved on to the next, and so on until the harvesting was finished.

The village wood—there is a sort of timber reserve near each centre—is, as a rule, municipally controlled, and each family in the community is apportioned an allotment of the woods sufficient in area to supply its needs for firewood and winter fuelling and otherwise. This illustrates the extent to which, in a very densely peopled country, community service must be organised.

Hard Toil of the Small Farmer.

The whole of the country has been improved out of all recognition by the hard, patient toil of the small farm holder. It has been said that if the test of a country's prosperity is to enable the largest possible population to live on the smallest possible area, then Belgium may justly be considered one of the most prosperous countries of the world.

PLANTING AND DE-SUCKERING BANANAS.

By GEO. WILLIAMS, Director of Fruit Culture.

Among banana-growers generally the mode of planting is by suckers, which are allowed to develop from the original crown, and varying opinions are freely expressed as to the stage which suckers should have reached before removal. The bottle-shaped specimens with a heavy base, and which have not developed foliage or that beyond the initial sword leaves are mostly favoured.

As a result of experiments conducted in different banana-producing countries it has been proved that (as with other plants of this nature) strong suckers from vigorous plants show no advantage over small and what may be called miserable specimens, even those usually called bulbs, nor over plants grown from a single eye or bud removed from a butt with but a small section (1¼-inch diameter and about ¼-inch thickness attached). Planting the large sucker in its natural state will lead to a slightly earlier first bunch being produced if it survives the attack of beetle borer; but instances, if any, are extremely rare where a well developed sucker will produce a bunch equal to that grown on its first follower. Where the central or crown growth is eliminated, two or three plants may be allowed to develop each producing a better bunch than the original. Selecting butts and splitting these into sections according to the number of eyes showing is also much preferable to using suckers as now planted. In each system recommended, the "sets" should be planted beneath at least 4 inches of soil; this eliminates the possibility of the plants being eaten out by weevil borer before they become established. It should be noted that "bits" are planted with the buds or uncut surface facing downward.

From the inception of the plantation in tropical districts where rainfall is plentiful and reliable, careful attention to desuckering can so regulate the season of maturity of the fruit that complaints about transport at this time of the year (when heavy rains and floods are to be expected) may be entirely obviated. The uncertainty of growth owing to the climatic conditions of the Southern and Central districts do not as a rule admit of reasonable anticipation, but no sound reason can be advanced as to why it is not given effect to in the North. It is admitted that the weight of fruit produced in a stool of three stems almost simultaneously will not quite equal that where the production is spread over a lengthy season (this has been noted at Cardwell by Instructor Stephens, also in the Central and Southern districts), though 72 dozen choice fruit were observed on one stool in the Central district, each bunch maturing at the same time. In the Northern district the season may be extended from May to December, and allowing from ten to fourteen months with Cavendish variety, and eleven to fifteen in the Gros Michel (a very wide margin) from the time of sword leaf stage to the cutting of the fruit, no appreciable difference would be present in the weight of the crop. The influence of wet season on transport, also the reduction of attack by fruit fly, will more than repay any little extra trouble which may be entailed. Systematic de-suckering of plantations is considered the most important practice conducive to success in a banana plantation.

STRAWBERRY CULTURE.

The subjoined notes on Strawberry Culture have been supplied by the Fruit Branch, Department of Agriculture and Stock:—

Although the strawberry is commonly considered to be better adapted to the climate of the temperate zones than to that of the semi-tropics, it is, nevertheless, the one berry fruit which can be grown to perfection in this State. Excellent fruit is produced in our Southern coastal districts and even under tropical conditions such as those existing at Townsville, when the plants are grown on alluvial soil and are well irrigated, very good fruit is produced. This shows that the strawberry has a wide range in this State and that it can be grown successfully over the greater portion of our Eastern coastline and the tableland country adjacent thereto, provided there is either an adequate rainfall or, failing that, a supply of water for irrigation.

The commercial cultivation of the strawberry is, however, confined mainly to those districts possessing a regular rainfall, and extends from the Redlands Area in the South to Bundaberg in the North. When grown under suitable conditions in this district, the strawberry has proved itself to be an early and prolific bearer, able to stand a fair amount of hardship, in the shape of dry weather, and to resist the attack of insect and fungus pests to a greater or less extent.

There is a good demand for the fruit, either for immediate consumption in this and the Southern States or for conversion into jam, and, as few crops yield a quicker return, it frequently enables a beginner to make a living whilst more slowly maturing fruit crops are coming into bearing. Many a pioneer fruitgrower has to thank the strawberry for his start, as it enabled him to make a living where he would, in all probability, have failed otherwise, and what applied in the case of our pioneers still holds good with the beginners of to-day.

Our strawberries are of excellent quality and carry well, so that they reach their destination in the Southern States in good order when carefully handled and packed, provided the weather is not excessively warm or the fruit over soft on account of excessive rainfall. The fruit is very suitable for jam, and the product of some of our local factories is not excelled elsewhere in the Commonwealth; further, the demand for strawberry jam exceeds the supply, so much so indeed that, for a considerable period of the year, it is not procurable. There is therefore room for the extension of the industry as the price realised for good strawberry jam in the Commonwealth should enable both producers and manufacturers to obtain a satisfactory return.

Soils for Strawberries.

Given suitable climatic conditions, strawberries will thrive in most soils, but the ideal soil for this fruit is a rich loam of medium texture, well supplied with humus, possessing perfect natural drainage, and capable of retaining moisture during dry spells—and the nearer one can get the soil to this ideal the better the results. Heavy, cold, badly-drained soils are not suitable, but any good loam or sandy loam, whether of scrub or forest origin, can be made to produce good berries if properly treated.

Preparation of the Soil.

There is only one way to prepare soil for strawberry culture, and that is, *thoroughly.* Nothing else will do. In the case of virgin scrub or forest land, which is, as a rule, fairly rich in humus, the land, after it is cleared, should be broken up deeply and brought into a state of as nearly perfect tilth as possible. On virgin soil, except it is of the poorest nature, it is not necessary to apply any manure for the first crop, as there is usually an ample supply of available plant-food and humus present in such soil, but for subsequent crops, or old land, systematic manuring is very important. Old land that is at all deficient in humus should have that deficiency made good, either by the application of a heavy dressing of farmyard or stable manure, such as a load to every 4 perches, or if this cannot be obtained, then by growing a green crop such as cowpeas or other legume which has been well manured with phosphatic and potassic manures and ploughing it in. The green crop so ploughed in should be allowed to rot and, when rotten, the land should be reploughed and worked down fine. If the green crop has received a generous dressing of phosphatic and potassic manure, then there will be no need to apply any further fertilising material to the land, as a complete manuring has been given; but if not, then the soil should be treated as recommended later on.

The surface of the land should be kept as even and level as possible, and, as already stated, it should be worked down fine, so that when the young plants are set out they will take hold of the soil at once and become firmly established.

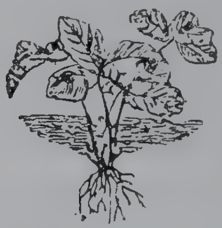
Planting strawberries on raw land, sour land, or land that has been indifferently prepared, is only courting failure, whereas, when the planting is carried out as advised, there is every chance of success.

Selection of Plants.

Always obtain strong runners from healthy, prolific plants. The first runners next to the parent plants are to be preferred, as they are usually the most vigorous and best rooted, and, further, they come into bearing earlier; but, failing these, any well-rooted, strong, well-grown runners can be used, and although they will not fruit as soon as the first runners they will give a good yield later on, and frequently continue to bear when the earlier fruiting plants have ceased.

Planting.

Having secured suitable plants, trim the straggling roots with a sharp knife; take care not to let them dry out, and plant as shown in the illustrations herewith, which are self-explanatory. Careless planting is responsible for many failures, especially too deep planting, as no strawberry will thrive if its crown is buried under the soil.



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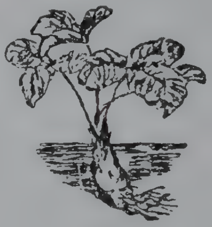

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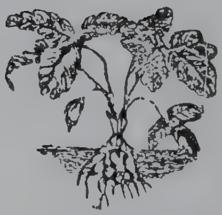

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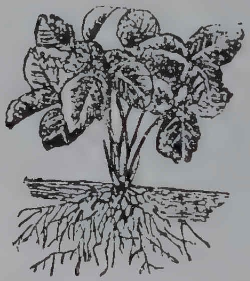

No. 4.

The distance at which to set out the plants varies somewhat in different districts, but it is not advisable in any case to overcrowd the plants, but to allow plenty of room. Personally, we favour planting strong plants at from 20 in. to 2 ft. apart each way, so that when planted the land can be worked all round the plant; or if row planting is desired, then the rows should be about 30 in. apart and plants set out at from 15 to 18 in. apart in the row. The illustration of a strawberry garden at Mooloolah, taken some years since, shows the manner of planting adopted by one of the most successful growers of his day, and it will be noted that the plants have plenty of room and are in no way overcrowded.

Cultivation.

Strawberry plants must only be surface-worked whilst growing or bearing fruit. The object is to keep down weed growth and to prevent the surface of the soil caking; but the cultivation must never be so deep that it will injure the roots. The best implement to use is the Planet Junior hand cultivator or similar machine; or, failing that, a good Dutch hoe of any type that may be preferred.

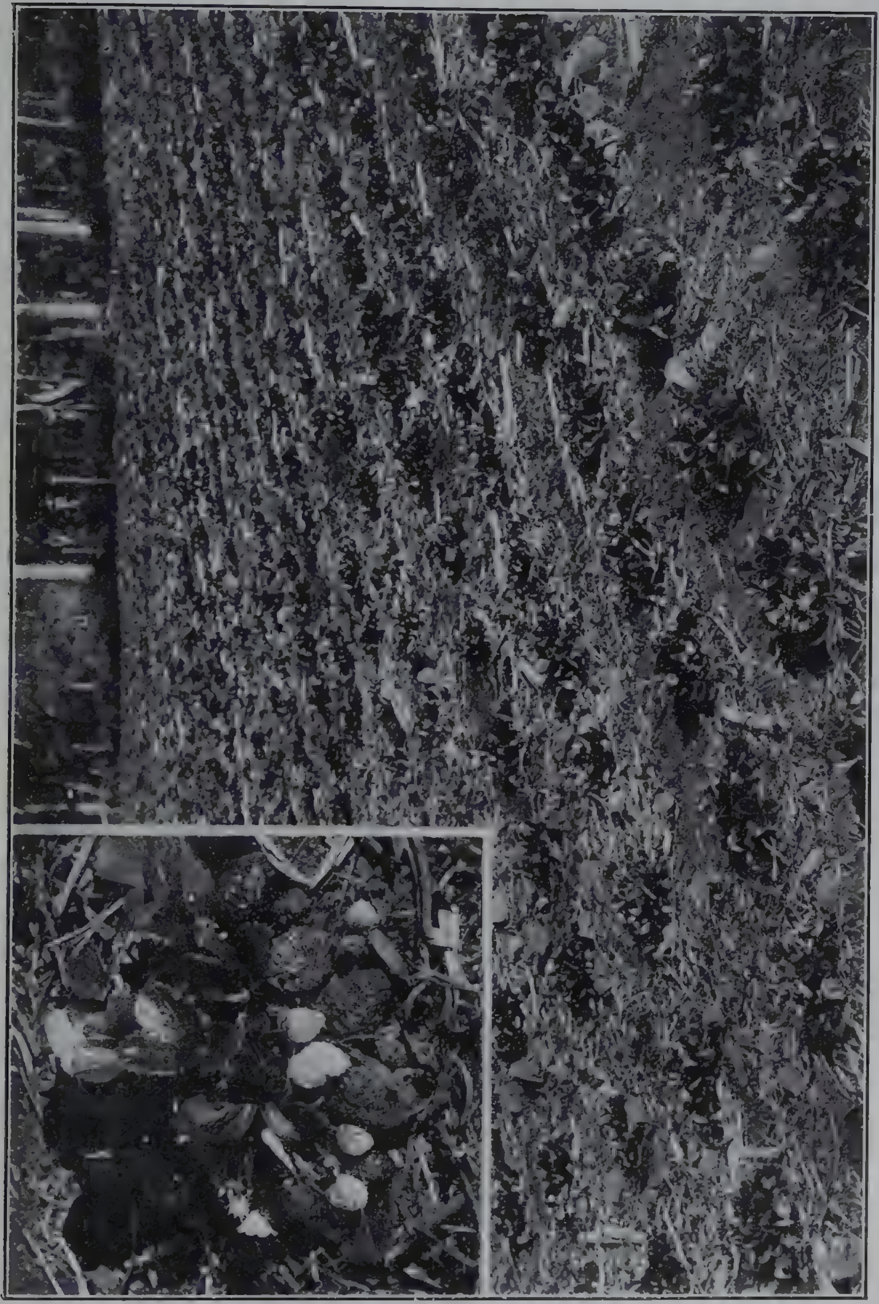

Plate 66.—A Strawberry Garden at Mooloolah.

Weed growth must be kept down and the surface of the soil must not be allowed to become hard and set, as if it does the evaporation of moisture from the soil will be greatly increased, and it will dry out rapidly.

If the plants are to be kept over for a second or third year, then the whole of the runners, other than those required to make good any losses in the original plants, must be removed, and the ground between the original plants must be well broken up and manured in late summer or early autumn, so that the plants will be in good nick for producing a crop of fruit the following season.

If the plants have been badly attacked by leaf blight it is a good plan to cut off all the leaves and burn them prior to working and manuring the land, as numerous fungus spores are destroyed thereby. The burning off is best done by scattering a little loose dry straw over the plants when the leaves have been cut off and have dried, and then setting fire to the lot. A light burning does not injure the plants, but is decidedly beneficial.

Mulching.

Mulching is seldom practised in this State, probably owing to the fact that a really good material for mulching is not readily obtainable, and therefore a light soil mulch produced by the surface working of the soil by means of a Dutch hoe, Planet Junior, or similar hand cultivator is all that is necessary. The use of a paper mulch has, however, much to recommend it, as it would certainly keep down weed growth and tend to maintain even soil conditions. A strip of paper mulch 18 inches wide would be all that is necessary, and the plants should be set through the paper at from 15 to 18 inches apart in the row. A further advantage to be derived by the use of paper mulch is that the fruit would be kept much cleaner as it would not be so liable to be covered with dirt as frequently happens if heavy rain falls or the watering is not very carefully applied.

Irrigation.

Where water is obtainable it should always be available for the plants' use during dry weather, as the ability to maintain an adequate supply of moisture in the soil at all times and thus maintain an even growth will result in larger and better fruit, and a heavy increase in yield. Strawberries pay well for intensive culture, and the money expended in providing a good system of overhead or other method of spray irrigation will be found to be a very profitable investment. A combination of paper mulching and spray irrigation will enable a grower to maintain a regular supply throughout the season of first class table fruit for which there is always a ready market.

Manuring.

The strawberry is a fruit that requires an abundance of readily available plant-food, and one that pays well for systematic and judicious manuring. In the 1924 edition of his pamphlet, "Complete Fertilisers for Farm and Orchard," the Agricultural Chemist to this Department gives the following advice, which it will pay to follow:—

"Some of our coastal country, between the 26th and 28th degrees south latitude, is particularly suitable for strawberry culture, frequently producing quite phenomenal crops. Some of our rich loamy soils found in our coastal scrub lands give the best results. In poorer sandy soils the improvement effected by artificial fertilisers, particularly such containing potash, is very marked, and a light dressing of 5 to 10 tons of stable manure per acre is very beneficial.

"A complete fertiliser for strawberries of the formula 4-8-10 should be used at the rate of 5 to 9 cwt. per acre.

"The following fertiliser mixture may be found useful:—

1 to 1½ cwt. sulphate of ammonia, or nitrate of soda
3 to 5 cwt. basic or ordinary superphosphate
1½ to 2 cwt. sulphate of potash
} per acre;

or,

1½ to 2 cwt. nitrate of soda
1 cwt. fine bonemeal
4 cwt. superphosphate or Nauru phosphate
2 cwt. sulphate of potash
} per acre;

The latter applied by two or three top-dressings, at the rate of 1 cwt. per acre, when fruit is first forming, and thereafter at intervals of two weeks."

Green Crop Manuring.

When dealing with the preparation of the soil, the importance of providing an adequate supply of humus was referred to, and the statement made that where a sufficient quantity of farmyard manure was not available to supply this essential ingredient to the soil, green crop manuring should be used to make good the deficiency. Humus plays a very important part in the composition of soils, and especially so in those devoted to strawberry culture, as its presence in the soil enables it to retain a much larger percentage of moisture than it would do were it deficient in humus. The power to retain moisture is of the greatest importance in a soil devoted to strawberry culture, as the strawberry is a shallow-rooted plant that soon suffers when there is any lack of moisture.

Moisture in the soil also enables the artificial fertilisers applied to become available, as they are of no use whatever to the crop unless their plant-food is capable of being dissolved by the soil moisture, and can thus be obtained therefrom by the roots of plants. When leguminous crops are grown as a green manure they should be manured with a fertiliser containing lime, citrate-soluble phosphoric acid, and potash; such as a mixture of finely-ground island phosphate and a potash salt, used in the proportion of four of the former to one of the latter. No nitrogen need be applied, as the plants will obtain their own from the atmosphere; and when they are ploughed into the soil it will not only be enriched by the plant foods contained in the fertiliser applied to the soil to produce the green crop, but also by the nitrogen that has been produced by the green crop itself; the whole forming a complete fertiliser, as it contains all the essential plant-foods in an available form. Green crop manuring is the cheapest way in which to apply nitrogen to the soil, so that, taking into consideration its value as a supplier of humus, it is of the greatest value when intensive cultivation is intended; and as the strawberry is a crop that demands intensive cultivation, its importance cannot be over-estimated, especially in soils that are deficient in humus. Cowpeas, vetch beans, small Mauritius beans, and the large black Mauritius beans are the best legumes for summer growth and vetches or tares and the grey or partridge field pea for winter.

Marketing.

Fruit for immediate consumption should be gathered whilst still quite firm. It should be carefully handled, graded for size and colour, and packed in boxes or trays containing a single layer of fruit. The use of punnets is not so satisfactory, as the fruit is more likely to be bruised, and it is doubtful if the methods of marketing the fruit in single layers can well be improved upon. Fruit for factory use is stemmed, placed in casks or other suitable receptacles, and forwarded as quickly as possible to the factory. Care in handling, picking, grading, or packing, always pays.

Diseases.

The most serious diseases of the strawberry in this State are those of fungus origin—viz., leaf blight and mildew.

The former can be controlled by the use of Bordeaux or Burgundy mixture applied as a spray, combined with the burning off of affected leaves, as previously mentioned; and the latter can be kept in check by means of precipitated sulphur applied with a light Feeney dust gun provided with an extended tube outlet. The ordinary sulphur generally used in dusting grapes is not efficacious. Insect pests seldom do any very serious injury, but when leaf-eating beetles or other leaf-eating insects are present they can easily be destroyed by spraying with arsenate of lead; or in the case of cut-worms these insects can be kept in check by the use of poisoned baits.

Varieties.

Although most of the standard varieties of strawberries have been grown in Queensland at one time or another, experience has shown that no one variety has proved permanent, but that it has been necessary to either raise new kinds from seed or to introduce them from elsewhere. Varieties producing perfect flowers have proved more profitable than pistillate sorts and are therefore most commonly met with.

After being grown in this State for a few years most varieties become weaker in growth, more liable to disease, and less prolific, so that they have to be discarded. The introduction of new sorts is thus essential, and there is no better way of doing this than by raising local seedlings. Some of the best sorts ever grown in the State have been locally raised seedlings, of which the Aurie, Anetta, and Phenomenal are good examples, and there is no reason why sorts equal or even superior to these should not be produced. Of the well-known standard varieties, such as Marguerite, Trollop's Victoria, British Queen, Pink's Prolific, Federation, Melba, and Edith, and several others that have been grown from time to time in this State, few are now planted. Phenomenal (a Gympie raised seedling) and Aurie, another variety of local origin, are now the varieties most commonly met with; other new varieties are being tested and some of them may prove to be adapted to our local conditions. The type of strawberry best suited to this State is a vigorous healthy grower—that is, a good bearer and producer of good coloured fruit of good, firm texture and fine flavour; a fruit that keeps and carries well, and that meets the requirements of both the fresh fruit trade and of the jam maker.

As strawberry seed is freely produced and readily germinates, raising seedling plants, which usually fruit the following season is recommended. By careful selection there is reasonable possibility of effecting improvement on existing varieties. Seed should not be collected indiscriminately but from fruit freely produced on plants showing marked vigour.

CARE OF THE COW AFTER CALVING.

By J. A. RUDD, L.V.Sc., Department of Agriculture and Stock.

CARE of the cow is more important than food at this very critical period of a cow's life. As calving occurs every year and with a healthy animal is a normal function on which so much after value as a dairy cow depends, it is necessary that her health and comfort should be studied if she is to continue as a profitable producer.

The First Thing to Do.

Assuming all is well and the cow has calved in good condition and is clean —i.e., voided her placenta or foetal membranes—the very next step is to clip the hair right off from below the vulva or external genital organs, under the tail, between the legs, right over the udder and teats and as far forward as the navel and milk veins showing under the abdomen. Clip likewise the tail down to the top of the brush, and wash this part thoroughly and give the udder and all parts which have been clipped a good soap lather, preferably with ordinary common soap. The object of this is to fill the pores which are now so stretched in the skin, so that no deleterious or disease spreading bacteria can enter the udder and pendulous parts of the body from outside for at least twenty-four hours or even more. The cow when lying down rests her udder on her hind feet, and if the udder is inflamed she puts on body pressure in order to relieve pain. As the udder lies between the body and hind legs, it is therefore essential that the hind feet should be kept clean and free from mud and filth.

Other Measures for After Care.

The next step is to make certain that the uterus, which is now about 8 feet long with thickened walls, due to a very big blood supply, should be encouraged to contract normally and rapidly so that all fluid contents which are harmful to the cow's health may be expelled as quickly as possible. The fact that this uterus is in a very pathological condition from the time the calf is born until it contracts to normal should not be lost sight of, for so much depends on the healthy state of this organ as to whether the cow conceives again normally, and gives of her best at the bucket. A cow with a diseased or septic uterus does not milk up to her full capacity. Pain which is constant, plus the fact that her constitutional vitality, which includes her digestion, is impaired as the result of an endeavour on the part of certain vital organs having extra work to neutralise the toxins from a pathological condition of the uterus, leave her open to attack in other parts of the body, such as the udder, and it can be definitely stated that an unhealthy uterus is one of the chief causes of a first class dairy cow otherwise healthy contracting mastitis from some unknown source. The conditions favourable to such a state must exist before a cow can become infected with mastitis, or any other disease of a contagious type; the natural resistance of every animal to disease is very great provided the vitality has not been lowered by a preventible ailment. The question arises how can one assist the rapid contraction of the uterus. Nature has provided for this very important function by making the sucking action of the calf the main factor in bringing not only a rapid contraction of the uterus, but also the expulsion of uterine fluids which, if left, will cause a great deal of trouble later on. The action on the part of the sucking calf cannot be explained, but it is known as a physiological action of great importance. The idea is fairly widespread that a calf should not be allowed to suck its mother at any time because it is supposed to prevent the cow from doing her best in the bail.

However much this opinion might have been or still is of value in dealing with ordinary mongrel bred cattle not of true dairy type, it is to-day a fallacy and in fact is a potent factor in not only spoiling a good cow, but also of destroying her splendid offspring, for the calf must suck and obtain the first milk from its dam in order that its bowels may be cleansed and its body may load up antibodies or preventives against disease. The only way that this important function can be performed is by the calf imbibing a sufficient quantity of the colostrum or beastings from its dam. It takes at least forty-eight hours for the calf to get sufficient from his mother to be of any practical value to him in his after life, and it is in this forty-eight hours that the cow derives her greatest benefit from its initial nourishment of her calf, as her uterus contracts from 8 feet with grossly thickened walls down to 2 feet with thinned walls and almost its normal size in this limited time. If the calf is left with its mother for four days this association between mother and offspring should be sufficient to place both on the high road to perfect health. There will be less milk fever, less mastitis, and less misery for both dam and offspring if this is carried out systematically and with the deliberation that is so essential in dealing with the improved modern type of dairy cow, in which mammary gland and other organs proportionately have been forced in order to obtain maximum production at the pail. If we get away from nature in this way by high production we must return to nature in other ways in order to compensate for such qualities as have been destroyed by artificial methods, and so preserve the balance which has been to a certain extent strained, if not destroyed, and assist the animal to regain the normal state.

A Matter of Common Sense.

The maximum amount of benefit accrues to the cow and her calf by adopting this simple method, which is one born of common sense and experience in the treatment of ailments which are common to dairy cows of the modern type, and which make then unfit permanently for the work which is ahead of them. A dairy cow is at her best, if she has been properly handled, at ten years of age and will continue so up to fifteen years of age, gradually waning as years pass on. I have known of dairy cows producing 18 lb. of butter for a week at twenty years of age, but these are exceptional cases only cited to show how it is quite possible even with maximum production to have longevity.

Care of the Calf.

The calf when taken away at the end of two or even four days should be left to fast at least twenty-four hours in order to give his overtaxed digestion a much needed rest, and also to make him anxious to drink out of the bucket of his own accord. It may be necessary to allow him to fast for even thirty-six hours, but longer than this is not advisable and a certain amount of persuasion may be necessary in order to induce him to start drinking from the pail. The cow is relieved of high tension when the calf is running with her, and when the calf is taken away she will, after twelve hours, give her milk freely.

It is not advisable to drain too much milk from an over distended udder at one milking and then not to empty the udder completely at any time for the first fourteen days—i.e., milk out but do not strip. Stripping with finger and thumb is a fruitful cause of what is commonly called Pea in the teat, which is only a warty growth in the passage or duct, due to extreme irritation of the highly sensitive mucous membrane of the teat duct. Once or twice all round with full hand on the teat is all that is necessary in order to empty the mammary gland without prejudicially affecting its productivity until the cow freshens on or about the twenty-eighth day after calving.

The calf does not actually feed on grass for twenty-eight days after birth but may peck at a few stems of hay, but if allowed to run at large before that time he is apt to pick bits of bark, paper, or rags, or even chips of wood, which may block somewhere about the region of the oesophogeal groove and cause endless trouble. A simple method of dealing with such a perverse animal is to tie him up for twenty-eight days and feed him on a fair amount of his dam's fresh milk for that period if possible; or even a small ration of it with skim milk and a little linseed oil—one teaspoonful of the latter to every three quarts of the mixed milk—i.e., separated milk and the whole milk of his dam. When the calf finally goes on to skim milk he is thus quite accustomed to his ration of linseed oil, which does not upset him, due to sudden change of diet, and he carries on without a check so that on the arrival of winter with the first snap of cold weather he is not found wanting; and no parasites, such as stomach worms, which are by far the greatest enemy of the poorly reared young calf, can find a lodgment in the viscera. In other words he is in a fit state to repel all parasites and bacterial invasion within certain limits, which, of course, are in direct ratio to the first-hand methods employed in the very early stages of its career. What is the use of rearing calves in the early spring or summer only to die in the following winter, and unquestionably this is the state of a great many young calves which are reared annually on skim, separated milk alone without the addition of fat of any kind in place of that removed in the process of cream separation.

Dish skimming is quite another proposition, and good calves can be reared if the milk so treated is sweet and wholesome, even at the end of twenty-four hours' standing in shallow pans.

The branding, earmarking, and castration of bull calves may be carried out at nine months, when the calf is on good grass and well over his weaning period, but if calves are put out of their natural run into a back paddock they should be taken to water daily at least once in twenty-four hours, and this should be clean and wholesome, preferably water from a well or good running creek. Ordinary waterholes are often highly infected with the eggs of parasites which find lodgment in the stomachs of calves, which may be half empty, due to young animals being worried by their fresh surroundings and anxiety to get back to their natural beat where they were first reared or born. Waterholes that are merely the reservoirs of paddock drainage are positively the riskiest method, from a health standpoint, of watering all classes of stock of all ages that is practised at present. They should be fenced off if they must be used, and the water pumped into troughs; this would obviate the risks of parasitical disease to some extent.

THE FARM TRACTOR.

ENGINE FAULTS EASILY REMEDIED.

By E. T. BROWN.*

The constant movement of the valve in its guide tends in course of time to wear the latter. In the case of an inlet valve this causes a leak; therefore, the ingoing charge is diluted. It is possible to buy a gland for a leaking valve guide, but it is generally better to replace the guide with a new one. In the vast majority of instances, the guide is a driving fit in the cylinder casting. It is, therefore, rather difficult to remove. It does not do to tap the lower end with a hammer, as this burrs it and prevents it passing through the hole in the casting. A stubborn guide can, however, be removed in a simple manner with a home-made gadget.

A long, thin bolt should be taken, thin enough to pass through the hole in the casting and long enough to project above the top of the cylinder. A washer should be put on, the bolt inserted in the casting from the bottom, and a large washer and the nut put on the end. By tightening the nut the guide is withdrawn gently, but surely, from the casting.

In isolated cases the guide is integral with the casting. If the guide be worn it must be bushed. The same plan can be adopted for drawing the bush into position. This is, however, a rather delicate job, and extreme care must be taken with the long, thin bush; otherwise it will be knocked out of shape.

An Engine Assembly Tip.

When the cylinder block is being returned to position two of the four pistons should be at the top of their stroke with the remaining two at the bottom of their stroke. The pistons pass into the cylinders easily, but the piston rings are apt to foul the bottom of the block. This is due, of course, to their natural springiness. Force must not be used, as the rings are extremely brittle. Special clamps can be obtained for holding the rings in position, but it is possible to make a gadget at home that will answer the purpose equally well. A piece of hoop iron, 1½-in. to 2-in. wide and 18-in. to 24-in. long, according to the size of the piston, should be taken and bent around the piston. A third of an inch from where the two ends come together the ends should be bent out at right angles. This means that they are parallel, but slightly apart. A clip should then be made and slipped over the two ends, this being tight enough to bring them together. By moving the clip towards the piston the band is tightened. This compresses the rings, but the band is loose enough to slide down the piston as it is being inserted. For a four-cylinder engine two clamps should be made, these being used first for the two top pistons and later for the lower ones.

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* In the "Farmer and Settler."

Exhaust Pipe Heat.

If the exhaust pipe comes anywhere near the driver's feet the heat tends to be oppresive. No floor boards are fitted, as a general rule; hence there is no protection. The heat can be eliminated to a very great extent by wrapping asbestos cord round the pipe. Asbestos is a perfect insulator, and is used largely for steam pipes with a view to reducing the loss of heat. In some cases it is possible to arrange for additional protection by fixing a piece of asbestos sheet above the exhaust pipe.

If coil ignition be the system adopted on the farm tractor, the operator should understand how to detect faults as they arise. If the engine will not fire and no conclusion can be arrived at regarding the cause the engine should be run with the starting motor, after switching on the ignition, and the ammeter watched. If it be seen that the reading rises and falls it may be taken that the low-tension wiring is in order. If the reading is steady the make-and-break mechanism should be examined, and if found all right there is probably a shortening in the low-tension circuit.

If no reading be obtained, it indicates either that the accumulator is exhausted or that there is a loose connection or a broken wire in the low-tension wiring. The fault should be looked for in the cables running from the junction-rod or switch to the coil, or from the coil to the distributor, and the terminals on the accumulator should also be looked to. To test the coil, apart from the distributor, the engine should be turned by hand with the ignition switched on, and a cable removed from the central distributor terminal and held half an inch away from any metal part of the chassis. If the coil be in order, a strong, regular spark is obtained.

Radiator Water Level.

The water level in the cooling system must be maintained if the engine is to function normally. The conditions under which the farm tractor works are such that rapid evaporation is usually the rule. When the water is cold it should be 2 inches to 3 inches below the overflow pipe; the system will be full when the water expands when the engine is hot. So long as the water comes above the inlet pipe there is no call to add more, but on no account should it be allowed to fall below this.

THE WHEELS OF THE CAR.

VARIOUS TYPES COMPARED.

By RADIATOR.*

History has no record as to who was the inventor of the wheel as an assistance to transport, but certainly wheels have always been a most vital portion of vehicles of transport, and probably there exists to-day no better examples of what can be done with wheels than in the motor car. The service that must be done by a car wheel is greater than that of any other vehicle, even the railway train. The wheels of the latter may run at high speed, but they do not encounter the road bumps of a car's wheels.

In the days before motor cars the wheels of nearly all motor vehicles were made of wood, with an iron tyre. Because of the use of those wheels on gun carriages by the army, the wheels were sometimes known as artillery wheels. It was not unnatural that the first cars were fitted with wooden wheels, and these wheels applied to cars became generally known as artillery wheels.

The wire wheel works on a fundamentally different principle from that of the wooden wheel. In the latter case the weight of the axle rests on the lower spokes so that the spokes at the bottom are in compression. The wire wheels on the other hand are so arranged that the hub hangs from the top of the rim; that is, the upper spokes are in tension. The wire wheel is remarkably strong and has the great virtue for high speed work that although it is possible to buckle it, it is practically impossible to completely smash it. The chief objection to the wire wheel is the fact that it is very difficult to clean. This objection has been overcome in the case of certain high priced cars by covering the spokes with light sheet metal discs.

A more modern type of wheel is the steel artillery wheel (often known as the Sankey wheel). This wheel consists of two sections of pressed steel welded together to form an all-steel wheel with tubular spokes. This type of wheel is becoming increasingly popular. The reason why the wheel was not developed years ago is that the electric welding process used in joining the two halves of the wheel is only a comparatively recent innovation in the steel-making industry. This wheel has not the resiliency of the wire wheel, but it is otherwise quite a good job.

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* In the "Farmer and Settler."

Another type of wheel that was very popular a couple of years ago is the disc wheel. The disc wheel consists of a pressing of mild steel to which the rim is riveted. The disc wheel has the great advantage that it can be cleaned in a very short time, but there is the objection that it behaves somewhat like a drum and so adds to the noisiness of the car.

From the point of view of the Australian country driver, the artillery (either wood or steel) wheel has a great advantage over other types inasmuch as it is possible to coil a rope or chain around the tyre and rim should the car become bogged. This trick is impossible with disc wheels, and is liable to damage the very light spokes in a wire wheel.

Virtues of each Wheel.

It is difficult to decide which is the best type of wheel and much depends on the taste of the owner. The wire wheel is, if anything, the best wheel for riding comfort, and also gives slightly the longest tyre life. However, it is the most expensive as to first cost and takes a wealth of trouble to keep it clean. The disc wheel, although easy to keep clean, is noisy and rigid. The wooden artillery wheel is rigid and tends to develop squeaks when the wood shrinks and thereby loosens the joints. The steel artillery wheel is rigid and although a good job is a little unsightly in the opinion of the writer. A rigid wheel means that the tyre life is not quite so long as with a resilient wheel.

Detachable Wheels.

Practically all cars on the road to-day have either detachable wheels or detachable rims, so that in the event of a puncture the motorist can replace the whole wheel or rim without the bother of mending the puncture on the road.

The detachable rim is much more popular on American cars than on British vehicles, also the wooden artillery wheel is essentially an American fashion.

Disc, wire, and steel artillery wheels have for many years been detachable, but it is only quite recently that the wooden detachable wheel has made its appearance, and a very smart looking job it is.

The detachable wheel is secured in position by various means. In all cases a hub is mounted on the axle end and over this hub is pushed the hub sleeve, which carries the wheel spokes. In many cases the hub sleeve is held to the hub by a number of capped bolts, while in other cases the hub has a special wheel cap screwing on to the hub, which holds the wheel in place. Most of these latter type have a special locking device which the owner should always check to see that it works when a wheel is replaced.

Where the wheel is held on by a number of bolts, they should be occasionally checked to see that all are tight. A little grease on the shanks of these bolts will often remove unpleasant wheel squeaks.

Where detachable rims are used, the motorist should, when replacing tighten all bolts equally so that the rim will be symmetrical on the wheel. Nothing wears tyres so rapidly as a rim set a little askew.

The tyre and tube on the rim of the wheel serve to insulate the chassis from all minor road irregularities, while the springs insulate the car from the major bumps.

Tyres.

Years ago the fabric tyre was the only type; this tyre was built up from layers of canvas and rubber. To-day, however, the cord tyre has completely superseded the fabric tyre. The cord tyre carcass is built up of cotton cords impregnated with rubber and surrounded by rubber. To this carcass is vulcanised a thick rubber tread. The cord tyre is capable of standing far more flexing than the fabric without the walls breaking. Because of this fact the introduction of the cord tyre was followed by the introduction of the low-pressure or balloon tyre. In the fabric tyre days, the pressures used in tyres varied from 50 lb. to 80 lb. to the square inch, whereas, to-day, the pressure varies from 20 lb. to 35 lb. to the square inch, depending upon the size of tyre and weight of vehicles.

The makers of tyres recommend pressures to be used for various wheel loads on any size of tyre. This pressure recommended is always the lowest pressure consistent with long life in the tyre, so that the owner may have the maximum comfort due to a soft tyre, but yet not destroy the tyre due to under-inflation. The reader would be well advised always to adhere to the tyre manufacturers' recommendations, and to purchase a pressure gauge with which to check the pressure.

CLIMATOLOGICAL TABLE—JANUARY, 1930.

Supplied by the Commonwealth of Australia Meteorological Bureau, Brisbane.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·72	88	76	96	15	73	9, 10, 11, 20	3,080	18
Herberton	..	79	66	87	13, 14	57	13	1,746	25
Rockhampton	29·80	85	72	98	14	68	12.30,31	2,659	23
Brisbane	29·92	83	69	95	20	64	29, 30	994	23
Darling Downs.									
Dalby	29·88	86	65	100	19	58	11	386	14
Stanthorpe	..	79	61	97	19	51	11	208	14
Toowoomba	..	78	61	93	20	56	3, 6, 7	649	18
Mid-interior.									
Georgetown	29·69	90	74	98	1	70	31	714	22
Longreach	29·73	98	75	108	13	68, 69	29	399	10
Mitchell	29·83	90	69	103	19	58	1	228	6
Western.									
Burketown	29·68	93	78	102	3	65	7	871	12
Boulia	29·72	101	75	109	19	67	1, 2	18	1
Thargomindah	29·80	95	75	105	11, 12	63	4	127	3

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of January in the Agricultural Districts, together with Total Rainfall during January 1930 and 1929, for Comparison.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of Years' Records.	Jan., 1930.	Jan., 1929.
North Coast.	In.		In.	In.
Atherton	11·64	29	23·99	17·03
Cairns	16·24	48	33·06	26·99
Cardwell	16·46	58	38·64	28·01
Cooktown	14·21	54	30·80	24·27
Herberton	9·62	43	17·46	14·40
Ingham	15·94	38	25·42	31·09
Innisfail	20·03	49	34·56	35·58
Mossman	15·08	17	42·93	36·38
Townsville	11·29	59	17·58	15·96
Central Coast.				
Ayr	11·44	43	14·36	25·38
Bowen	10·20	59	20·46	33·32
Charters Towers ..	5·54	48	11·19	3·15
Mackay	14·22	59	30·70	16·64
Proserpine	16·14	27	28·53	39·62
St. Lawrence	9·62	59	17·47	8·14
South Coast.				
Biggenden	5·37	31	9·66	5·65
Bundaberg	9·06	47	15·92	4·21
Brisbane	6·52	79	9·94	4·60
Caboolture	7·77	43	11·17	6·62
Childers	7·82	35	14·02	6·37
Crohamhurst ..	12·74	37	22·91	12·37
Esk	5·84	43	7·71	10·74
Gayndah	4·72	59	9·29	10·53
Gympie	6·75	60	12·11	9·34
Kilkivan	5·64	51	10·57	13·43
Maryborough ..	7·54	58	11·34	4·18
South Coast—continued:	In.		In.	In.
Nambour	9·91	34	19·18	9·46
Nanango	4·75	48	3·92	9·51
Rockhampton ..	8·34	43	26·59	3·89
Woodford	7·95	43	15·15	13·22
Darling Downs.				
Dalby	3·32	60	3·86	1·81
Emu Vale	3·31	34	1·32	2·48
Jimbour	3·65	42	2·31	1·53
Miles	3·78	45	2·45	1·28
Stanthorpe	3·62	57	2·08	1·73
Toowoomba ..	5·03	58	6·49	5·00
Warwick	3·58	65	2·03	2·43
Maranoa.				
Roma	3·26	56	1·53	1·24
State Farms, &c.				
Bungeworgorai ..	1·98	16	2·16	0·80
Gatton College ..	4·14	31	5·95	2·46
Gindie	3·74	31	6·88	1·30
Hermitage	3·31	24	..	3·23
Kairi	8·60	16	..	21·97
Mackay Sugar Experiment Station ..	14·34	33	28·94	16·33
Warren	5·22	15	..	0·44

GEORGE G. BOND, Divisional Meteorologist

Answers to Correspondents.

BOTANY.

The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—

Melia as a Febrifuge.

F.P.D. (Kuranda, North Queensland)—

We have no definite information as to use of Melia as febrifuge, though probably it is used in some places, for Melia trees are largely planted throughout the tropics and subtropics of the world, and the Australian one is generally put down as a variety of *M. azedarach* widely spread, wild or cultivated, over the tropics. The inner bark, especially that of the root, has been used as a remedy for intestinal worms. It is cathartic and emetic, and has been used for cholera. The fact of its being used for this purpose is due to its bitter nature, so it is quite likely that it has been used to mitigate fevers in some parts of the world. The berries, as you know, are poisonous, and every year we generally receive specimens for identification with a report that they have been the cause of the death of pigs, the plants growing over pigsties having been left for shade. Birds, however, seem to eat them with impunity. We have heard of a decoction being prepared from them and sprinkled on plants to protect them from attacks of insects.

Horse Mushroom.

W.T.N. (Buderim Mountain)—

There is little doubt that the mushroom described by you represents the Horse Mushroom, *Agaricus arvensis*. This is edible and only differs from the common field mushroom, *Agaricus campestris*, in being larger and coarser in all its parts. There is no definite way of telling edible from poisonous mushrooms. The change of colour of the flesh, the floating or sinking in water, the discoloration of a silver spoon, and other tests cannot be relied on at all. The only way is to actually know the mushrooms with which you are dealing. A rule always to follow is this—that where you see a mushroom with white gills, a ring round the stem, and a volva or bag at the base of the stalk, these are always to be avoided. Some mushrooms are poisonous to some and harmless to others. It is a safe rule with mushrooms never to take a hearty meal until they have been tried in small quantities on account of the individual differences of people. First cook in small quantities and taste discreetly.

Fairy Floss—Native Flora.

S.A.S. (Thulimbah)—

Helichrysum diosmifolium is very common in Southern Queensland, and is generally known to the children as Fairy Floss, and Pills Plant is another local name we have heard given to it. It grows with two forms, one with white, the other with pink flowers. The pink is common, we think, in the granite belt. It is distinguished by the little flower heads, and the leaves are small and rather strongly scented. *Choretrum candollei* is a leafless shrub with long, slender, wiry branches, bearing in spring time a profusion of very small white flowers. The boronia is probably either *Boronia granitica* or *Boronia repanda*. Most likely they are both growing in the granite belt. The flowers of this little shrub vary from a pale pink to a very deep pink, almost carmine.

If you wish to know the names of the wild flowers of your district it would be as well to send to us next season small pieces a few inches in length pressed flat between sheets of paper before sending; number each specimen, and names will be advised according to their numerical order.

Quinine Berry—Emu Apple.

J.D.R. (Yeulba)—

Your specimen is *Petalostigma quadriloculare*, commonly known in Queensland as the Quinine Berry, though we have also heard it called Emu Apple and the tree referred to as Bitter Bark or Native Cinchona Tree, though these latter names more strictly belong to another tree, *Alstonia constricta*, fairly common in Queensland, and the bark of which has some value as a tonic. The Quinine Berry or Petalostigma is very common in parts of Queensland, and in some places, particularly in parts of the West and Central Queensland, makes a very nice, shapely, shade tree. The berries or fruits are very bitter, but are not known to have any values as a tonic or medicinal virtues.

Thorn Apple *(Datura stramonium).*

T.J.T. (Beaudesert)—

Your specimen is *Datura stramonium,* the Stramonium or Thorn Apple. It is one of the worst weeds we have, and as the seeds are supposed to be the most poisonous part of the plant there is no doubt at all, we should say, that the weed was responsible for the death of the pigs. It is a plant of rather nauseating taste, and as a general rule stock do not eat it unless it it chaffed up by mistake with other fodders.

Nut Grass Eradication.

R.B. (Wondai)—

Poisonous sprays have always proved of little or no value in eradication, but experience both here and abroad has shown that small patches can be eradicated by the application of cheap grade salt—such as waste salt from butchers' stores or hide stores—at the rate of ½ lb. per sq. ft., either dry or in the form of brine. It is practically impossible to entirely eradicate Nut Grass where the weed covers extensive areas, but it can be kept in check by proper handling, particularly where the land is used for large crops such as cotton and maize. The rows between the standing crops should be regularly cultivated so that the green shoots are cut off below the surface of the ground. At first the cultivation should be carried out at least once a week, gradually extending the interval as the weed becomes less aggressive. We must not forget that the Nut Grass tuber is a storehouse of nutriment for the young shoots. So long as no shoots are being sent up the tuber remains dormant, but in cultivated land the food material stored in the tuber is being used up in the formation of the young shoot. Cut these off regularly and the tuber eventually becomes exhausted. Another point is that the formation of fresh tubers is absolutely dependent upon the leaves, and if these are not allowed to grow fresh tubers cannot be formed, and the old ones must die of exhaustion. This method means a great deal of work, but it is either continuity of the work of eradication or leaving the Nut Grass entirely alone; there is no half-way method.

Ornamental Trees.

H. McC. (Millaa Millaa)—

Quick-growing ornamental trees which might succeed at Millaa Millaa are:—Coral Tree (*Erythrina* spp.); Poinciana (*Poinciana regia*); Jacaranda (*Jacaranda mimosaefolia*); Silky Oak (*Grevillea robusta*); Cape Chestnut (*Callodendron capense*); Flame Tree (*Sterculia acerifolia*); Candle Nut (*Aleurites mollucana*); Rain Tree (*Pithecolobium dulce*); Cypress Pines and Ordinary Pines (any varieties obtainable in North Queensland).

Young plants should be obtainable through any nurseryman at either Charters Towers or Townsville or you could write to the Director, Botanic Gardens, Townsville, who could put you in touch with supplies. Mr. H. Wright, City Gardener, Cairns might know some local nurseryman there who could supply your wants.

Wild Tobacco.

R. H. (Chinchilla)—

Your specimen is the Wild Tobacco, one of the varieties of *Nicotiana suaveolens.* The plant is very common in various parts of Queensland and sometimes coming very thickly on the edge of the dry scrubs of the Western Downs. It contains the alkaloid nicotine, and is poisonous to stock, though at times the stock seem to eat it without ill effects following.

YOUTH AND THE JOB.

"As youth faces its great task to-day," said Lord Moynihan in a Burnley speech reported in the "Yorkshire Post," "let it remember that there is something more in the task than the completion of it. When I listen to my friends who engage in business of any kind, whether they are masters or workmen, I hear of almost nothing but 'hours of labour,' 'rates of pay,' 'new distributions of authority,' and 'management and direction.' All are very necessary, but I confess to a great longing to hear of the spiritual side of labour, of men's purpose and pride in their efforts. I am eager to hear of the value of the professional spirit of men thinking less of what they get out of their job than of what they put into it."

Photo.: E. Rye.]

PLATE 67.—CANUNGRA CREEK FALLS.

WHAT WE HAVE LOST.

There was never before, perhaps, a period in which work had less spiritual value for most people than it has to-day. The worker himself has been lost in the complicated machinery of production, and in our worship of efficiency the machinery has come to be considered somehow such a desirable good in itself as to warrant any sacrifice in its name. Social intercourse in the same way has succumbed to the machinery ostensibly provided for it. Clubs and organisations of all sorts for bringing people together are legion, but conversation has almost as completely disappeared as has letter writing between friends. We are so busy and wearied in rushing from one meeting to another that our minds have almost entirely ceased to meet. We have lost the power to see life steadily and see it whole. We see only parts, the physical part, the machinery part, and have failed to see the end of all these things, the full rounded life of the spirit for the growth of which alone these other things have any validity or value. Of what possible use is a machine, whether it is a dynamo or a university, unless it is to produce something of essential value for human life?—James Truslow Adams, an American thinker and philosopher.

Photo.: E. Rye.]

Plate 68.—Sunshine Falls—above Canungra Creek.

THE LESSON OF THE BOY SCOUT MOVEMENT.

''There are still worthy people who, being ignorant of physiology, live in an unreal world, and are even yet unaware that unless and until you cultivate and develop the body and brain of the child all attempts at intellectual instruction will prove futile. They are the witnesses of the triumphant contribution of the Boy Scout Movement, and render it a lip service of praise, but they decline to learn from it. Yet its lesson is profoundly true and full of meaning to all educationalists in this generation. It is a lesson of physical discipline, of educational adventure, of youthful training and glad obedience; it is one of the wise interpretations of that service which is perfect freedom; it educates by equipping the body first and drawing out its faculties and senses; it both harnesses and develops the boy and leads him of his own interest and desire into the path of manual work and the arts and crafts; it trains men not for the classrooms or the pedagogue but for life.''—Sir George Newman, Chief Medical Officer of the Board of Education, in his report for 1928 on ''The Health of the School Child.''

General Notes.

Staff Changes and Appointments.

Mr. J. E. N. Bell has been reappointed Government Representative on the Dawson Dingo Board.

Mr. Charles Queale, Inspector of Stock, at present attached to Brisbane, has been transferred to Dalby.

Mr. H. J. Walker has been appointed Temporary Inspector of Slaughter-houses for the period from 6th January to 29th April, 1930.

Mr. H. Afford, of Birdsville, has been reappointed Government Representative on the Diamantina Dingo Board; and Mr. C. C. Morton, of Boulia, has been appointed a member of that Board.

Messrs. R. G. C. Fraser, S. R. Trundle, A. Marshall, and G. E. V. Wort, Councillors of the Cleveland Shire Council, have been appointed Honorary Rangers under the Animals and Birds Acts.

Constable D. P. O'Sullivan, of Tara, has been appointed an Inspector of Slaughterhouses; and Mr. P. J. Short has been appointed a temporary Inspector of Stock and Slaughterhouses for the period from 21st December, 1929, to 4th March, 1930.

The services of Mr. F. C. Shaw, Temporary Inspector of Slaughter-houses, have been continued for the period from 5th February to 17th May, 1930, in order to relieve Mr. J. R. Collier, Inspector of Slaughter-houses, Cairns, who will be on leave for that period.

Mr. F. H. S. Roberts, M.Sc., of the Prickly-pear Station, Gogango, via Rockhampton, has been appointed an Entomologist on probation, Department of Agriculture and Stock; and Mr. Robert Veitch has been appointed Chief Entomologist, Department of Agriculture and Stock.

Sugar-cane Prices Board.

An Order in Council has been passed removing all members of Local Sugar Cane Prices Boards throughout Queensland who were appointed by notices dated 23rd March, 4th May, 8th June, and 31st August, 1929. These members were appointed for the 1929 cane-crushing season only. As this season is now finished, these members have been removed from the Boards to which they were appointed so that new members may be appointd for the 1930 season.

Honey Board to Control Honey and Beeswax.

Nominations will be received by the Returning Officer, Department of Agriculture and Stock, Brisbane, until 5 p.m. on the 3rd March, 1930, for election as growers' representatives on the Honey Board.

Four such representatives are to be elected by persons who subsequent to the 10th April, 1929, owned at least five hives of bees in movable frames and market the honey and beeswax therefrom. Each nomination is to be signed by at least seven persons owning bees as described.

Canary Seed Board.

An Order in Council has been passed giving notice of intention to extend the duration of the Canary Seed Board for a further three years. The present Pool expires on the 28th February, 1930, and this Order in Council gives notice of intention to extend the pool until 28th February, 1933. The notice contains an invitation to demand a poll to decide the question of continuance or otherwise. This petition must be signed by not less than 10 per cent. of canary seed growers. If it is received a referendum will be held, and a simple majority will decide the extension or otherwise. If no petition is received the Pool will be automatically extended.

Fruit Marketing Organisation—Statutory Extension.

On the 26th September, 1929, an Order in Council was passed giving notice of intention to extend the operation of the Fruit Marketing Organisation Acts for a further five years as from 1st January, 1930, and calling for a petition of 500 fruitgrowers for a referendum to decide whether or not the Acts should be extended as suggested. A petition was received, and a vote taken on the question. As the vote was in favour of the continuance of the Acts, an Order in Council has now been passed continuing the operation of "*The Fruit Marketing Organisation Acts, 1923 to 1928*," for a further five years as from 1st January, 1930; that is, until 31st December, 1934.

Too Young at Eighteen.

Whether a youth of eighteen years is too young to drive a heavy motor lorry was one of the questions discussed at the recent commercial motor show in London. The general opinion seemed to be in agreement with Major-General S. S. Long, a director of Lever Brothers, Limited, who raised the question. For a lad of eighteen to drive a heavy motor vehicle was to ask for trouble, he said. The lad might have a lot of road sense, but there was a lot of dare-devil in him. He could not have the road sense of a man of forty.

Not too Old at Sixty.

To-day's limitations on the commercial value of a man have nothing at all to do with the number of years lived. There is a place for everyone who is willing to work, and to try to go forward, says Mr. Henry Ford in the course of an interview published in the "Ladies' Home Journal." "After having employed hundreds of thousands of people at the Ford works," he continued, "we have come to think not at all of age, but only of experience and the capacity to learn. In point of fact, we should prefer, if we could make the choice, to have all of our people between thirty-five and sixty years old, for then we should have a stable and experienced force. We should not care how much over sixty the men were so long as they could do their work. In no circumstances would we have a force made up solely of young men."

Fur-bearing Rabbits.

An Order in Council has been issued bringing fur-bearing rabbits under the provisions of the Animals and Birds Acts, and additional Regulations have been promulgated under those Acts specifying the conditions under which Angora, Chinchilla, and hutch fur-bearing rabbits may now be kept in Queensland. Every person who wishes to keep these rabbits must obtain a license from the Under Secretary, Department of Agriculture and Stock, Brisbane, the fee being according to the number of rabbits held. The license to keep up to 25 is 10s., and the fee proportionally increases with the number of rabbits until it reaches £2 for anyone keeping from 201 to 400 rabbits. For each 100 animals or part thereof a further 10s. is then charged. Licenses are not transferable. The rabbits must at all times be maintained in a rabbit-proof enclosure, constructed according to specifications supplied by the Department. It must be kept padlocked at night and at all other times when not under direct personal supervision. The rabbits must be kept in hutches within the enclosure, and these hutches must also be kept padlocked. The carcasses of all rabbits that die from disease and all excreta must be destroyed by fire. No rabbits can be removed from the enclosure without the permission of the Department of Agriculture and Stock. It must be distinctly understood that the only rabbits that can be kept are purebred Angoras and Chinchillas or other approved fur-bearing rabbits.

Licenses will only be issued in the following pastoral districts:—The Darling Downs, Moreton, Wide Bay, Burnett, Port Curtis, South Kennedy east of the 148th meridian, North Kennedy, Atherton, Cairns, Innisfail, and Herberton.

Obituary.

The late Mr. Lawrence P. Doyle, Inspector of Stock, Mount Isa, who was accidentally drowned on the 4th instant while attempting to cross Lagoon Creek, near Mount Isa, was a very promising officer of the Department of Agriculture and Stock. After passing the examination for Stock Inspectors, the late Inspector Doyle was appointed to the Kingaroy district in January, 1926, and was later stationed at Cooyar, Cloncurry, Julia Creek, Camooweal, and had only recently taken up his duties at Mount Isa.

During his regrettably short term of service Mr. Doyle became very popular with his fellow officers, and the manner in which he carried out his duties was fully appreciated by the Department and the stockowners generally, for he displayed keenness and exceptional ability in his work. Much sympathy is felt for his parents, Mr. and Mrs. T. Doyle, Ashgrove, in the loss of their son, who was only twenty-six years of age at the time of his death.

Proposed Barley Pool.

A notice of intention to create a Barley Pool has been passed by the Executive Council. The notice will stand for thirty days, and within that time any thirty barley growers can petition for a referendum to decide whether or not such pool shall be established. If a referendum is held a majority of 60 per cent. will create a pool. If no petition is received the pool will be created automatically.

The pool applies to all barley produced in Queensland, and will last for seven years. The Board will consist of two elected members and the Director of Marketing. The Board will be a marketing board, and all barley will become the property of the Board.

For the referendum (if any), any person who grew barley for sale within the last three years shall have a vote.

Subduing Tuberculosis.

Much evidence can be cited (says an American report) from breeders' experience in America to show how erroneous is the reasoning of those who would let bovine tuberculosis run its course. In many States tuberculosis is on the decrease, and, notwithstanding the imperfection of the tuberculin test, real progress is being made in subduing this cattle disease. A recent report from the Michigan Department of Agriculture states that, in Ogemaw county, nearly 12,000 cattle were tested and only nine reactors found. In another county, where 32,000 cows were tested, only 212 reactors were found, when on the first test there were nearly 1,500. In other words, the percentage of infection in this county on the first was 4.78 per cent., while on the second test it was only 0.66 per cent. ''We can hear some say that the tuberculin test does not reveal the diseased animals,'' adds the report. ''To this it can be stated that the animals slaughtered from these sections show a marked decrease in tuberculosis. In fact, in some sections scarcely any diseased animals are found upon slaughter at the packing houses.''

World Congress of Poultry Breeders—Proposed Queensland Representation.

Next year a world congress of poultry breeders and poultry fanciers will be held at the Crystal Palace, London. The United Poultry Club and the National Poultry Breeders' Association are anxious that Queensland should be represented at that conference, so that the industry might benefit as the result of the observations of a delegate from this State. With that object in view a deputation representing the organisations concerned waited on the Minister of Agriculture and Stock (Mr. H. F. Walker) and urged that Mr. P. Rumball (Government Poultry Expert) should be sent by the Government and those engaged in the industry in Queensland to represent the State. The members of the deputation stated that so earnest were those engaged in the industry that they would be willing to contribute a quota of the expenses involved.

Mr. Walker stated that the Government would be quite unable to finance such a project, no matter how desirable it was, but if the organisations concerned could place before him a concrete proposal to cover the expenses of the expert abroad the Government would be prepared to pay his salary.

The deputation comprised Messrs. J. F. Haynes (United Poultry Club) and A. Cousner, and S. Lloyd (National Poultry Breeders' Association).

Mr. Haynes declared that the poultry breeders were agreed that Mr. Rumball was the man most fitted to represent the State. If the Government would make his services available those engaged in the industry would co-operate with the Government in every possible way.

Mr. Cousner said that the poultry industry was more valuable than the wheat industry, and was well worthy of the expenditure of a few hundred pounds.

Mr. Lloyd pointed out that in addition to studying the scientific side of poultry breeding, the representative of the State could also gather much useful information relating to the marketing of products.

In reply the Minister stated that at a recent conference of Ministers of Agriculture he had proposed that the Commonwealth should send an expert to the congress, the expense to be borne jointly by the States. That proposal, however, was not agreed to. Due to the finances of the State the Government was unable to foot the bill of sending an expert overseas. The cost would not be a mere £200 or £300, as the members of the deputation suggested. If, however, those engaged in the poultry industry raised the money necessary to cover expenses he would agree to the services of Mr. Rumball being made available.

The members of the deputation stated that they would take steps to organise on the lines suggested before the end of February, by which time it should be possible to get in touch with poultry breeders in all parts of the State.—''Brisbane Courier.''

An Economic Blunder.

Economically and in every other respect a nation can only thrive if it is composed of citizens sound in mind and body, and any taxation that makes the middle class sterile is a bad economic blunder.—Hartley Withers in "Our Money in the State."

Milk-Rot and a Remedy.

A Toowoomba subscriber writes:—"I never heard of a serious case of milk-rot until I got my hand bad with it recently. Since then, quite a number of people have told me of bad cases and the great danger of its spreading up the arm. My right hand midfinger is in a bad way . . . It seems to me right and fair to offer you these few lines on the subject in case you think well of inserting a warning note in your Journal. I would suggest the wisdom of milkers always washing their hands well after milking each cow, or as often as convenient at milking time. In case of any sign of milk-rot appearing I recommend bathing the hand in a hot boracic lotion and then applying iodine freely. I am suffering a good deal of pain and inconvenience for having neglected this precaution at the early stage of the trouble . . ."

Early Importations of Pigs.

Writing from his home at Koorama, Marlborough, Queensland, Mr. Albert Rake advises in connection with early importation of pigs into Australia that on looking up old records he has ascertained that his father, the late Charles Rake, of Enfield, South Australia, imported his first Middle Yorkshire pigs from England in the year 1889. At about the same time he secured some Improved Berkshires and Poland-Chinas from Sydney. The latter breed he secured from Mr. Woodhead, of Sydney, in 1881, these being, he understood, from imported American stock. Mr. Charles Rake also imported Ligurian or Italian bees for his apiary at Enfield, the one swarm he secured acting as foundation stock in South Australia. Of the Middle Yorkshire pigs Mr. Rake writes that they did a great business in these right up to 1905, when the family partnership was dissolved. Sales were made to breeders in all States, in Tasmania, and New Zealand. The price in those days, 4 guineas per head, was considered exceptionally good. The Yorkshires imported from England were bred by the late Mr. Sanders Spencer, two sows and an unrelated boar forming one of the early shipments. These pigs cost 60 guineas landed in Adelaide—also record figures of that period.

Points in Dairying.

The milking-shed and bails must be substantial and well built. Drainage, light, ventilation, protection of the persons milking and the cows from the prevailing winds, ease of cleansing, and good facilities for handling the cows are the main considerations. Fortunately, these can be accomplished at a much less expense than is usually believed. Concrete floors and gutters with ample fall are recognised as essential to a well-ordered milkshed and bails. Not only do these assist in securing good sanitary conditions, but they make it possible to effectively save all the fertility in the manure, as well as contributing to the comfort of those carrying out the work of milking.

Some dairymen feed their cows in the bails, but the ideal is to have independent and separate feeding stalls.

The use of odourless disinfectants in the milk-sheds at frequent intervals is desirable, as it is unreasonable to expect that the broom alone will keep the milk-shed as clean as is necessary.

The periodic use of lime wash is essential as a disinfectant, both to present and maintain a cleanly appearance throughout the shed. Unslacked lime sprinkled on the floor is most advantageous. The whole of the milking routine should be so planned that all operations that tend to raise dust take place after the actual milking of the cows is completed.

Milk yield must, however, always be considered in relation to environment. If a cow is pampered its yield goes up. The fact that a cow has given 1,200 gallons in a well-managed valley herd does not mean that it will be suitable for milk production on an upland farm. Hardiness must also be taken into consideration. Economy of production must never be lost sight of; that is to say, whether the cow is an economical converter of food. It has been shown that large food consumption does not necessarily mean increased yield. With some cows it does, but this is not invariably the rule. While on this point the maximum yield desirable might be considered. The 2,000-gallon cow is not an economic proposition for some breeders. Every breeder must judge for himself where his economic limit is in this respect.

Quensland Pig Industry Committee.

At the last meeting of the Queensland Pig Industry Committee, Miss Joan Mackay was appointed secretary in succession to Mr. E. J. Shelton, who has acted as chairman, secretary, and treasurer for a period of two years. Miss Mackay is also Secretary of the Queensland branch of the Australian Stud Pig Breeders' Society.

Work Does Not Kill.

Well-regulated work does not kill, it rather conduces to longevity. I have before me, while I write, the statistical bulletin of the Metropolitan Insurance Company of New York for January, 1929, and from which I extract data in support of the views I have advanced of the value of work as an agent making for longevity. We are familiar with the fact that in Britain the mortality rate of unoccupied persons is higher than that of those occupied. This experience is not confined to that country. Between 1911 and 1927 the death rate of both United States and Canadian wage earners and their dependents declined 33 per cent., while that of the general population dropped only 16 per cent. Consider for a moment what this decline in the death rate means. It means a considerable saving of the industrial life of these countries, in other words the life span has been extended. In 1927 the expectation of life among the wage earning classes was 56·42 years at birth, whereas sixteen years ago it was 46·63 years. The addition of nine years to the life expectancy of the industrial population of the United States, and of Canada, is a great acquisition, for, while this has taken place among the working classes, the gain in the life expectancy of the general population is only 6·06 years. Work is thus not a curse but a blessing to mankind.—Sir Thomas Oliver, Vice-Chancellor, University of Durham.

The Pig Section, Brisbane Exhibition, 1930.

The secretary of the Royal National Agricultural Association (Mr. H. W. Watson) has recently sent a circular letter to probable exhibitors at this year's Brisbane Exhibition that certain alterations and additions to the Pig Schedule have been decided on. These include several important alterations of which likely exhibitors should make careful note pending the issue of the complete schedule. They are: No quarantine restrictions at present operate between Victoria and Queensland, and it is hoped that prior to the date of entry the quarantine restrictions between Queensland and New South Wales will have been lifted:—

1. Not more than three entries may be made by any exhibitor in any one class.

2. In all classes for which there are eight or more entries a third prize will be paid, the amount to be one-half of the second prize in that particular case.

3. The Pig Pavilion will not be open to the public after 7 o'clock each evening of the Show.

4. All Stud Pigs, four months old and over, must be registered in the Australian Stud Pig Herd Book, &c.

5. Any sow entered in the Sow and Litter Class shall, if not farrowed on judging day, be allowed to compete in a "dry" class, and vice versa.

6. The sow in the Sow and Litter Class shall be eligible for entry in the open classes, and if successful will be allowed to compete for the Championships.

The general classification of ages in the Berkshires, Tamworths, Poland-Chinas, Duroc-Jerseys, and Gloucester Old Spots will run as follows:—

Boar, 2 years old and under 5 years.
Boar, 18 months old and under 2 years.
Boar, 12 months old and under 18 months.
Boar, 8 months old and under 12 months.
Boar, 4 months old and under 8 months.
Boar, under 4 months.
Boar and his progeny, progeny of any age, sex optional, to number three head, to be bred and owned by the exhibitor of the sire.

The classification for Sows in these breeds will be similar, with the addition of a Sow and Litter Class.

In Yorkshires, Large Blacks, and Chester Whites, the classification will be—

Boar, 12 months old and over.
Boar, under 12 months.

And similar age classification in the Sow Classes.

The schedule will contain a Litter Weight Contest, Porker, Pig, and Bacon Classes.

A Remedy for Sore Teats.

A Toowoomba reader writes:—"As a remedy for sore teats in cows, I have found fresh beef dripping the quickest healing thing."

Parental Authority.

My remarks upon "Natural Capacity and Health" in relation to careers would be incomplete if I ignored the claims of youth to settle its own affairs. This leads me to the subject of parental authority, giving—or not giving—way to the demands of the expanding intellect and the conscience of youth. A parent's decision should never be so inflexible that it remains to the bitter end; it should, for example, never thwart a son's career in a matter of conscience.

When the youth has reached the age of discretion a parent should not consider himself to be the sole arbiter of a son's conscience. In matters of faith a father may suggest and direct, but he cannot compel obedience. To make a career successful, there are other things to be considered than natural capacity and health, and these are personal choice and determination.—Sir Thomas Oliver.

What a Farmer Is.

A farmer is described as—

A capitalist that labours.

A man that works eight hours a day twice a day.

A man who has every element of Nature to combat every day of the year.

A man who is a biologist, an economist, and a lot more ists.

Who gives more and asks less than any other human being.

Who takes unto himself for his own sustenance and that of his family those of his own products that other people will not utilise.

Who gives more and asks less than big cities to infuse red blood into society that is constantly decadent and whose own salvation is the virility that it draws from the rural sections.

Who sells his products for what the other fellow cares to pay for them, and who buys the other fellow's products at what the other fellow cares to charge for them.

Start the Young Farmer Right.

Mr. I. F. Brown, buyer for Armour and Co., has been offering American calf club members some good advice:—

"One can never produce a good calf without good breeding. This does not refer alone to the amount of pure blood in the animal, but also to the indications of quick fattening and growth, as well as proper carcase proportions. I have seen some pure-bred beef animals which were quick, easy finishers that would make top carcases, and others in the same breed with just as much pure blood that were slow-maturing, long-legged, and rough-framed. One cannot select quality on breeding alone, but must look to the actual characteristics of the animal as well.

"Perhaps the greatest criticism that I find in the hundreds of club calves which I see and buy every year is the high proportion of this undesirable type of pure-breds. No matter what the club exhibitors may have paid for these calves when they were young, the high value does not exist in them when they reach me. A firm, smooth finish, with high carcase yield, is the essential, and the calf that excels in these particulars is the one that should always win."

Mr. J. H. Boyle, buyer for Swift and Co., speaks in a similar vein. He says:—

"I would like to emphasise this fact to you boys and girls. Start with a good quality calf, follow carefully and faithfully the handling and feeding of your calf so you can show a finished product when ready for market. By doing this you would be practically assured of prices above the average, and, if finished, you will have market toppers."

What these men say has been remarked and commented upon many times in our calf-club shows, remarks the "American Hereford Journal." Too many club members are equipped with poor calves to start with, and are expected to accomplish the impossible, which is to make prize-winners and market-toppers of them. There are still a good many people who believe that a pure-bred calf is a pure-bred calf, and that all that is necessary to give a boy or girl a running start for a club championship is to furnish them with a pure-bred calf. But there are many kinds of pure-bred calves, and if we are to get these boys and girls started off on the right track as feeders and breeders of beef cattle, we must get them to understand and recognise the right kind and the wrong kind .

Pig Feeding in Rhyme.

Mr. A. N. Duckham, during his association with the Cambridge Pig Recording Scheme, has issued between twenty and thirty ''circulars'' for the guidance of his members. They are bright and cleverly edited. The following extracts from a recent circular are typical:—

A FEW NOTES ON FEEDING.

Meal to water; one to three
Will with pigs and you agree.
More water in another trough
Makes sure your pigs will have enough.

The cost of the ration is what it produces, *not* the price per ton.

Two grains of common sense are worth 20 lb. of balanced rations.

Don't underfeed or overcrowd; one slum problem is enough. *But* overfeeding pigs underfeeds you.

It is an offence to add water to milk. It is almost a crime to dilute well-balanced proprietary or home-mixed meals with poor quality feeds or home-grown cereals.

Overfat and overweight pigs are market misfits. Water is the cheapest feed. The fatter and heavier the pig the less water it contains.

MEAL REQUIREMENTS.

Half the pounds per pig per day
Is stones per pig per week, we say.

If you want to make mistakes, mix the meal just before feeding. If not, mix at a quieter time of day. Half a ton at a time is a useful unit to mix on small farms where there are not many ''bins'' or men available.

DRY OR WET FEEDING.

Which is the best depends on conditions on your farm. Both give equally good results. Extra labour of wet feeding balances losses due to wind and rats in dry feeding and cost of water carting. Dry feeding of a good mixture properly rationed *plus* freely available water is almost foolproof. Cubes worth about 10s. per ton more than meal in saving labour and wastage. For dry feeding outside on windy days, damp the meal slightly. In wet feeding always soak meal; this prevents swallowing or choking over lumps.

A FEW NOTES ON BREEDING.

Good feeding and sound management won't make silk purses out of ''dud'' sows' ears.

Don't prejudice a sow or a gilt. Let her have at least two or three chances of breaking her own record.

Select and weigh gilts for breeding at bacon weight. But only if they look like baconers and they come from sows with consistently good litter records.

Don't serve gilts too young. Nine to ten months is soon enough.

After four litters a sow's at her best.
Let her have eight; then a well-earned rest.

A good boar is half the herd. A bad one is three-quarters.

A ''scrub'' boar is the herald of misfortune; but a pedigree boar with a good record may be the dawn of an £ s. day.

Feed pigs by weight rather than age. Time and money spent on weighing is well repaid in small feed bills. Keep a check on pigs' feed consumption and rate of live weight gain. One pig-weighing machine is a better investment than several tons of pig condiments. Weighing makes trouble to-day, but saves money to-morrow.—''Live Stock Journal'' (England).

THE JOURNAL APPRECIATED.

A Toowoomba reader writes (21*st January,* 1930):—*''I find the 'Queensland Agricultural Journal' most interesting and helpful . . .''*

Broom Millet—A Reminder.

With the crop nearing maturity, growers of broom millet may be reminded of the wisdom of field selection of seed.

Unfortunately, many farmers still rely on the "scoop shovel" method of obtaining their seed from the heap after hackling—a method which leads to great deterioration both in the yield and quality., The best growers select their seed in the field from the best heads. The number of heads required to sow a few acres is comparatively small, and the selection of seed in this way is justified by the improvement effected in the yield and the quality of the brush.

The most important points to look for in selecting seed heads are as follows:—

1. Fine, long, straight, round, abundant, uniform fibre with absence of thickened central stem.
2. Seed compactly situated mostly at the end of the brush (to facilitate hackling), the brush arising compactly in a close whorl from the stem and well exserted from the leaf sheath.
3. Freedom from disease such as red stain (on the brush and in the stem) and smut.
4. Good, plump, well-developed seed of light colour.

It is a good plan to have a special seed plot of broom millet where a few of the very best heads can be sown and in which improvement can be more quickly effected, as owing to the cross fertilisation which occurs plants with good brush may be cross fertilised by plants in the vicinity bearing poor brush, and with a smaller seed plot the selection may be made more rigorously with less chance of including the poorer types. Then sufficient seed can be selected each year to sow both the seed plot and the field area, keeping a few of the very best heads for the seed plot.

In the seed plot the heads can be left until they are properly matured before harvesting, though they may require protection in the field from birds, which can be given by covering them with a light muslin bag. After harvesting, the heads are thoroughly dried, hackled, and the seed cleaned and put away. Fumigation with carbon bisulphide and storage with naphthaline is recommended to secure the seed against weevils and grain moth.

The Modern Farmer—Science Sees Him Through.

The steady decrease in farm population in many countries gives the average man a sense of uneasiness about agriculture. Many farmers are actually ceasing to farm, and are moving to swell the ranks of city workers and eaters. Yet it would seem that, as the nation's mouths increase in number, the farm population should also increase. Something must be out of joint.

The new-type farmer is the joker in the logic. This farmer has learned to increase his wheat and butter without increasing the number of hands to do the work. He "knows how"—which is to say, he is scientific.

The work of the new-type farmer has been gradually revolutionising the farm, and even remodelling the man behind the plough and the herd. The new-type farmer struck up a very friendly acquaintance with the soils of his farm; he "jollied" the sour ones with lime, jacked up others with salts, fed them legumes, and then egged his perked-up soils on to his corn, wheat, and potatoes. He fashioned a better kernel on the cob and a better ear on the stalk. He learned what made winter wheat good, and at the last moment threw a double dose of protein into the head. He hit upon a standard family size potato that the housewife liked. He went after bugs, beetles, and borers with poison and gas. He serumed his pigs and shaped them for the selling scales. He turned eyes and testing tubes on his dairy herd, slashed it here, petted it there, fed it according to formula, and then watched the butter fat roll up.

In fine, whatever the crop, whatever the animal, this new type of farmer knows how to breed it, feed it, and sell it. His theory is that neither luck, tradition, nor old wives' tales can take the place of knowing how to farm. No wonder, then, that he discards hand tools and puts in the machine—the tractor, the combine, the milking machine, and so on. Moreover, the more he knows his job, the better he likes it. Getting close to his problem stirs his brain power into action, and the farm job takes on all the aspects of a challenging business.

Now it is nothing new that science is thus striking out into farming. But not everyone has yet realised the meaning of this movement—that the old "farming with ordinary skill" will soon be passing into history as a tale that is told. This is no discredit to the old farmer; he was a fine type of man. But one of these newer farmers knows how to produce twice as much as the old farmer. Moreover, he has the ingenuity to improve his products, making them more desirable to the buyers. The "ordinary skill" farmer produces only mediocrity.

Will the farm population, then, continue to decline? Undoubtedly it will continue to decline to a point where the effective scientific machine farming will produce all that is needed. Is this the end of the story? By no means.

The recent revolution in farming has concerned itself with crops. But the progressive farmer is convinced that the same scientific methods he has learned to apply to running his farm can be used in conquering his other difficulties. The farmer's living conditions, for instance—community institutions, social status, opportunity for enjoying life in equal measure with persons in other occupations—have always had points of serious deficiency. Another revolution may occur here.

Science will penetrate and ramify through every phase of farm life. The new-type farmer is learning that men make their own living conditions, and that human elements can be combined to make needed institutions. He is not going to listen to the people who tell him that farmers can't get social amelioration. Does the farmer want facilities within reach for the health of his family? Yes, and he is going to change the health organisation of his section and have doctors and a hospital. Whatever he wants that average town communities enjoy he will learn to get.

When science was put into the hand of this new kind of farmer he was given a far-reaching talisman. And, if anyone thinks that the farmer will confine his Aladdin's lamp to wheat, cotton, and milk, he will be gravely disappointed, for the men who are coming to dominate farming are bound to know how public business is managed, how sound economic institutions are built, how living is made better—in fine, how things are done by human beings to bring welfare into being for themselves. He is looking to science to see him through, and, for one, I believe, not in vain.—C. J. Galpin, in "The Country Gentleman."

Correct Functioning of Tractors.—Traction and Wheel Slip.

One factor in tractor operation which gets but little consideration from the tractor owner, and which, in fact, we hear little about at any time, is the question of transmission of the power generated by the motor to the draw-bar.

Under stationary conditions a tractor engine develops a certain definite horse-power, but, when the travel of the machine itself is taken into consideration, this is considerably lessened by the effort required to move the machine over the ground. In this respect the wheels, their weight, their shape, their size, and the type of lug used is a big consideration.

It is generally considered that when working in soft ground the longer the lug the less slipping is experienced, but this is not always the case. If the top-soil is soft and the sub-soil is hard, then it is necessary to have a long wheel lug in order to get through the soft soil and get a grip on the hard soil beneath. Should a long lug be used in hard ground, however, very considerable effort is required to lift the weight of the tractor on to the lugs, which means considerable waste of the power being generated by the motor. Endeavour to always use the shortest lug possible, according to the class of land being worked and the load being pulled.

Slipping is a most common cause of waste of power, and the general reason for it is the overloading of the machine. When wheel slipping is experienced, particular care should be taken to see that the right type of lug is introduced in order to obviate it. In sticky ground, the best types of lugs are those which have the sharpest angle, and will allow themselves to be cleared. The wheel that fills up with dirt between the lugs simply increases its own diameter, thereby increasing the speed of the tractor, and decreasing the power of the motor, on account of the extra pull required with the bigger diameter wheel.

It can be seen from this that the wheels are closely related to the engine, and, if particular care is not given to the type and placing of the lugs, considerable power is lost with the resultant uneconomical working.

An overloaded motor is a quick-wearing one, which rapidly depreciates and becomes costly in upkeep. If you must overload your motor, then see to it that you are using a fuel which will give you the best results under the circumstances. There is no doubt that the premier tractor fuel to-day, which can be depended on, not only to give greatest power and economy, but also to give those essentials of good idling and easy starting under bad weather conditions, with a minimum of crankcase dilution, is the new Cross kerosene. This new fuel is a departure from any kerosene previously manufactured by the Shell Company, and is specially prepared to meet every requirement and every class of work carried out by the tractor owner to-day.

"Agricultural Bias"—Trying out the Lads.

Boys may have the makings of successful farmers, but in the first place they require the opportunity to learn whether they are suited to the work, and whether the work is likely to make a permanent appeal to them. To this end, it is desirable that the boys should have first-hand experience, and a week or so on a farm, although short, would be to better purpose than any quantity of talk. The Canterbury Rural Vocational League appreciates this, and the camp that has been arranged by the league for Christchurch boys is the first practical step that has been taken. This opportunity will enable a few perhaps to decide whether they have a natural "agricultural bias."—Christchurch "Sun."

None but the Best.

It is, in the end, to the maker of the best butter, either Danish or New Zealand, that the public will turn, and in the same way it is to the reliable worker, willing to do rather more than his fair share of the labour—who gives of his best—that the rewards of industry will be accorded. "None but the best" would be a powerful slogan to ally with New Zealand produce for the overseas market if it were substantiated in fair season and in foul by the proof that it is no idle boast, and "nothing but the best" might be applied with equal force as the motto of the worker in the wool-shed, the factory, or the office chair, who is aware of his duty to himself, no less than to his employer and the State, to do his work well at all times, no matter how irksome the task may be.—"Otago Daily Times."

What Rationalisation Means.

This definition of rationalisation, a new term of commercial jargon of the day, is interesting:—"Rationalisation to me means an honest reasonableness and foresight in the conduct of the business which I, with my fellow workers, am engaged in," says Mr. Launcelot E. Smith, C.B.E., in "Modern Transport." "A workman who has to waste time in hunting for his tools, or a workman whose tools are inefficient or out of date, is sheer waste. Taking this simple case as an analogy, and applying it to the business as a whole, it follows that a rationalised business means that kind of a business in which throughout the greatest orderliness prevails, handiness in every department and in every sense from top to bottom, and a carefully reasoned anticipation of coming changes, with the courage of conviction to prepare for them."

A Blessing on Wheels.

"Difficulties of housing and social contentment are being solved by the car. The charabanc, to which many people have taken such violent exception, has been the instrument of more industrial goodwill, more education, and more happiness than all the lectures, soup kitchens, and free legal advice ever afforded to a long-suffering public. Let us encourage comfort and avoid waste of physical energy by every means known to science. The motor-car is the best of all weapons for this purpose. Does anyone grudge the educational possibilities of the motor tour to young people, who have far more to learn than their grand-parents in a much shorter space of time? The motor-car is the poor man's yacht, magic carpet, Riviera, and school all rolled into one at the cost of a little monthly economy to the benefit of a highly successful British industry."—Professor A. M. Low, in the "Sunday Dispatch."

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

The Home and the Garden.

MOTHER AND CHILD.

DAME JANET CAMPBELL'S REPORT.

The protection of motherhood and the safeguarding of the infant and the little child is of the first importance to every country, but especially to Australia with her scattered population and wide distances.

The protection of maternity and infancy is a relatively new branch of public health and social service, but its importance is being rapidly realised.

In reviewing the maternal and child welfare work in Australia, the impression is gained that the time has arrived when effective development depends upon securing an agreed policy and direction with a view to economy of effort, time and money, together with special attention to certain aspects of training, organisation and education, in order that the work as a whole may be rendered fully efficient, more scientific, and not unduly dependent upon the goodwill, enthusiasm and generosity of individuals, and, perhaps most important of all, that it shall take its proper place in organic relationship with all other branches of established public health work.—Dame Janet Campbell.

THE report on maternal and child welfare in Australia by Dame Janet Campbell, D.B.E., M.D., M.Sc., (Senior Medical Officer for Maternity and Child Welfare, Ministry of Health, London) who last year visited Australia, has been issued by the Commonwealth Department of Health. Dame Janet says, inter alia:—

For Australia as a whole the total maternal death rate in 1928 was 5.98, that is, approximately six mothers died for every thousand babies born alive; this is not only a rate which is excessive in itself, but it is the highest rate on record during the period under review. The lowest figure reached was 4.27 in 1915, which was not a normal year, and since 1922 the death rate shows a steady and almost uninterrupted rise—a circumstance which must cause considerable anxiety and disquietude.

Of the causes of death at the time of childbirth, puerperal sepsis, which should be to a great extent preventable, is the most important. It accounts for 2,335—nearly one-third of the deaths in Australia—and 11,569 deaths in England and Wales, which represents a rather higher proportion.

Nature Aids.

The visitor to Australia forms a very favourable impression of the domestic and social circumstances of the people from the point of view of health and hygiene. The climate is, on the whole, excellent and such as to encourage a wholesome open-air life; there is abundance of sunlight, and, if the heat is excessive during the summer months, there is little of the unpleasant cold, damp weather which is apt to be so productive of illness, and there is still less of continued cold or frost even in the southern areas. There are ample opportunities for open-air exercise, games, and sports; the housing is good; there are no tenements and no slums in the English sense of the term, though housing conditions may not be wholly satisfactory in certain districts in the large cities. The average standard of living is high, and there is little evidence of poverty, although at the present time there is, temporarily, considerable unemployment. There are few, if any, congested areas of population. All of which make for healthy infancy as well as healthy adult life.

Improved Education.

The safety of the mother and infant must ultimately depend upon the skill and knowledge of the professional attendant, whether doctor or midwife. It is generally agreed that the education of the medical student and pupil midwife should equip them adequately for all duties which they may be called upon to undertake; much has been done to ensure this, but even yet the training is not wholly satisfactory and stands in urgent need of further improvement. The action of the Universities of Sydney and Melbourne in creating Professorships of Obstetrics indicates the increased importance attached to midwifery, and is the first step towards much needed reforms in the curriculum. Some experience of domicilliary midwifery is a valuable and indeed a necessary part of the training, but it should come after an effective grounding in hospital practice and should be under the direct control of the teachers responsible for the midwifery course.

It is also most desirable that careful attention should be given to the care and hygiene of the new-born infant, including the management of breast feeding and the initial difficulties which may need to be overcome in regard to this; also in the care of the premature or weakly infant, &c. Although the midwifery nurse will undertake the actual handling of the infant, it is desirable that this shall not be left wholly to her knowledge and discretion as has too often happened in the past, but that the doctor shall assume ultimate responsibility and shall be properly equipped by his own training for so doing.

Training in Mothercraft.

It is most desirable that training in mothercraft shall receive full official recognition and support. In order to secure a uniformly high tradition and standard of instruction and to prevent the setting up of a number of small training schools, which cannot offer full teaching facilities, general regulations might well be made to which all approved mothercraft schools should be expected to conform; for example, as regards the accommodation, equipment, facilities for teaching, qualifications and experience of the staff, length of the training period, admission of trainees, &c., while the whole of the course should be under medical direction and control; but due latitude should be left to those responsible for the course in each institution to modify or vary the detailed methods taught.

Diversity of medical opinion and practice in regard to infant feeding in Australia and elsewhere indicates that there can be no one stereotyped or standard method applicable to every infant under all circumstances, and suggests that the ordinary baby is tolerant of, and can even thrive upon, comparatively widely different dietaries. Moreover, differences in local conditions, customs, climate, &c., in themselves make some modification necessary. Therefore, while the general organisation of the mothercraft school should be such as to ensure adequate training, room should be left for individual difference of opinion in the detail of instruction.

Effective Supervision.

A maternity service comprising arrangements by which any woman can obtain such necessary facilities as she requires for the satisfactory conduct of a normal or a difficult confinement when she is unable to provide all or any of these facilities for herself is the ideal to be aimed at in every district.

The establishment of public pre-natal (ante-natal) clinics is needed to which patients may come for advice and to which doctors may be able to refer their patients for consultation or a second opinion.

The obvious nucleus for such clinics is the service already established at the maternity hospitals. Although all of these are not as yet equipped and staffed to meet the full requirements of the pre-natal clinic, it should not be difficult to enlarge and extend their scope sufficiently to do so. They have the great advantage of being under the control of a specialist medical staff assisted by trained midwifery nurses, and their professional status is such that they can properly be used for consultative purposes; they are not in a position to meet the needs of women living at some distance who do not wish to engage the services of the hospital for the confinement, but there seems no reason why branch clinics based on the hospital should not be established where necessary with the assistance of the Health Department.

The alternative would seem to be the establishment of independent pre-natal clinics at the infant welfare centres as part of the maternity and child welfare organisation; but if this were done, although the centre premises and the services of the nurses might appropriately be made use of, there would probably be great advantage in arranging for the maternity hospital to be responsible for the medical consultations so that the high quality of the advice given might be ensured and also close association with an institution to which an abnormal case could be referred when necessary for treatment.

There are certain disadvantages in the ad hoc pre-natal clinic. For example, there is often difficulty in securing the medical service of practitioners fully conversant with ante-natal methods and able to give sound obstetric advice; there is the further disadvantage that the medical officer of such a clinic is necessarily in a somewhat detached position and rarely sees the termination of the pregnancy or is able to control accurately the conclusions which he has formed, as, although interchange of opinion between the clinic medical officer and the attendant at the confinement should be full and free, it is not always easy to maintain this in practice. Association between the hospital on the one hand and the centre on the other with its facilities for home visiting and education in hygiene and mothercraft would seem likely to yield the best results.

Community and Intermediate Hospitals.

There is already an evident desire on the part of patients who are not eligible for the maternity wards of the public hospital for a share in the advantages obtainable in a large and well-managed maternity hospital. The establishment of wards for ''intermediate'' patients would seem to be eminently desirable and would enable many women, able to pay reasonable medical and nursing fees, to have their babies under fully satisfactory conditions, instead of risking infection or other dangers in an ill-equipped private hospital.

Friendly inquiry at the ante-natal clinic or by a visiting nurse may bring to light various ways in which an expectant mother may need assistance—the provision of domestic help, for example, or the addition of fresh milk or vegetables to an unduly limited dietary, or convalescent or after-care treatment. Many voluntary associations are in a position to supply such needs and an endeavour should be made to put the woman in touch with the appropriate agency, either directly or through the almoner's department of the hospital when this exists.

Voluntary Societies.

Although the circumstances in Australia are not altogether parallel with those in England, it is difficult to escape the conclusion that sooner or later the work of the voluntary societies will come to a much greater extent under the supervision of an official authority which will be responsible for the general policy followed and for much of the cost of maintenance; and, while leaving reasonable freedom to the organisations to carry on and even extend the work of centres which they have founded, will establish new centres in areas where voluntary effort has not made itself evident, and provide such facilities as are practicable in districts too thinly populated to be served by centres in the ordinary way.

This would have the further advantage of encouraging greater co-operation among voluntary workers than exists at present. One cannot fail to be deeply impressed with the large number of voluntary societies which are in existence and which represent an immense volume of willing and devoted service, self-sacrifice, and generosity; but many of these societies are concerned with slightly different aspects of the same large issue, and independent effort involves unavoidable overlapping of work; there may even be two active societies doing similar work in the same district in a somewhat competitive spirit which not only does not make for the best results but is confusing to the general public, and may thus tend to damage the cause which all societies have so much at heart. Greater co-operation and unity of effort could not fail to be productive of economy of time and money and would enable the work to be done more effectively and successfully.

In Australia the local authority is often too small or the district too thinly populated to be entrusted suitably with much, if any, special maternal and child welfare work, and it is necessary for the State not only to decide upon the policy to be followed but also very largely to carry it out. This situation would seem to make it even more necessary to establish in each State a properly organised Division of Maternal, Infant, and Child Welfare as a branch of the Health Department in charge of a whole-time medical director responsible to the Chief Medical Officer of Health, before any general scheme or policy could become practicable.

Influence of Women's Organisations.

In order to carry through successfully any comprehensive scheme for social and health reform it is necessary to secure the active support of an informed public opinion. Questions relating to maternal and child welfare are of peculiar importance to women, who, after all, are in a position to appreciate most directly the disabilities, suffering, and even hardships which may be associated with maternity. Therefore, if the interest of the women of the country can be aroused one may look to them to produce the splendid driving force which is inherent in a sound and enlightened public opinion.

Women are still perhaps too patient and forbearing, and they do not as a whole fully appreciate as yet how much might be done to relieve the housewife of some of her burdens or to protect her physical health, but it is to women's organisations that we may look with confidence, not only to show every woman what might be done, but to persuade the community in general of the wisdom and practicability of the course they advocate, and so create that intelligent backing which is necessary to translate theories into action. Women's organisations have already done much to call attention to this matter—both those which are primarily concerned therewith, such as the Standing Committee for the Reduction of Maternal and Infant Mortality, and those—such as the National Council of Women—which fully recognise its importance though they are also engaged in considering other problems of social interest.

Research.

The study of maternal mortality and morbidity and of sickness and death during infancy is only in its beginnings, and although we can do much through administrative and medical measures to prevent and reduce the present loss of life and health, further knowledge is essential for satisfactory progress in order that the soundness of our methods may be tested by the results of scientific and organised research.

The measures so far discussed are concerned with maternal and child welfare, mainly in its local and routine aspects; a wider vision is also necessary. It is fully recognised that the organisation suggested for each State is beyond the present resources of some States, and it was no doubt in order to meet difficulties of this kind that the Royal Commission on Health recommended that the Commonwealth Government should assume some degree of active responsibility. Much could be said in favour of this policy; indeed, it is difficult to conceive of any aspect of human interests which is, or should be, the business of the whole nation more than that of Motherhood. The fundamental impulse of sympathy for the woman about to face her hour of trial is universal and needs no emphasis, and it is believed that this concern for the protection and wellbeing of the mother, rather than obvious economic national interests, moved the Fisher Government to pass the Maternity Allowance Act in 1912.

Commonwealth Responsibility.

The Commonwealth Government has thus become committed, and no departure from established policy would seem to be involved in a more definite participation in the common duty. The suggestion that something of this kind should be done would, I am convinced, evoke instant response from the people of all Australia, and, indeed, anything less than a simultaneous impulse throughout the Commonwealth under a united national inspiration would be inadequate to secure the change necessary to put into practice proposals involving the harmonious readjustment of so many administrative and personal relationships. A national centre is essential for the collection of information, for the examination of problems on a national scale, for investigation of work being done by the State authorities and the publication of comparative results, for the encouragement of research, and, should the Commonwealth Government adopt the policy of subsidising activities in this field, for providing expert advice in relation to such subsidies.

IN THE KITCHEN.

Prunes can be used in a variety of forms. The following suggestions are taken from a collection of fifty attractive recipes, supplied by Miss A. E. Millenet to the Fruit Branch of the Department of Agriculture:—

Prune and Tomato Conserve.—One quart tomato pulp, one cup prune pulp, four cups sugar, one lemon cut in small pieces, half-cup chopped walnuts. Cook all ingredients together until thick and clear, put into small glass jars and seal when cold.

Prune and Rhubarb Preserve.—Three pounds rhubarb cut in small pieces, 2 lb. sugar, 1 lb. cooked prunes, three lemons (juice and grated rind). Mix all the ingredients together and cook very slowly until thick, put in glass jars, and seal when cold.

Prune Conserve.—One pound prunes (soak all night in one pint of water), one orange (slice and soak in half-pint of water), one cup brown sugar, one cup seeded raisins, juice of one lemon, half-cup of chopped nuts. Drain the prunes, stone and return to the water, add the orange, raisins, and lemon juice, and cook very slowly until the fruit is perfectly tender, about half an hour. Add the sugar and nuts, and simmer again until thick.

Prune Chutney.—One and a-half pounds of prunes, 4 oz. sultanas, ¾ lb. onions, 2 oz. brown sugar, 2 pints vinegar, 1½ oz. salt, four tablespoons treacle, half teaspoon each of mace, cinnamon, and spice, a little preserved ginger, a tiny clove of garlic, Worcestershire sauce and cayenne to taste. Mix all together and boil gently until tender.

Prune and Pineapple Pie.—Mix one cup of prune pulp with one cup of shredded pineapple, half-cup sugar, one tablespoon of lemon juice, and a pinch of salt. Bake in a pie plate lined with pastry for twenty minutes in a hot oven, cool, and cover with whipped cream or a meringue made from the whipped whites of two eggs, four tablespoons of sugar, and half a teaspoon of rose water.

Prune Sandwiches.—One oz. walnuts, 1 oz. dates, 4 oz. softened prunes, one tablespoon golden syrup, one tablespoon lemon juice. Stone the fruits and mince finely. Chop the nuts finely and mix with the fruit, add the syrup and lemon juice. Use between slices of plain cake or brown bread and butter.

Banana Puddings and Pastries.

Make a nice short crust of 6 oz. of dripping to 10 oz. of flour, a little salt, a squeeze of lemon juice or vinegar, no baking powder is needed, make to a nice firm dough and roll once only; the more nimble you are at the preparation of this, once you have started, the crisper will be the pastry. The bananas should be peeled ready, with a few drops of lemon juice sprinkled over them or not, as you choose, cut out your pastry, and wrap each whole fruit in a piece, pinch in well at each end, and bake in a good oven for twenty minutes. This may be served with a custard, baked, or boiled, or with cream, or just milk, or may be eaten cold. The children just love them cold for school tucker bag.

Banana Tart.

Method: (1) Peel and cut bananas into rounds. (2) Place in a pie-dish. (3) Add grated rind and juice of lemon. (4) Add sugar and water. (5) Cover with short pastry. (6) Bake in a hot oven for twenty minutes.

Materials.—Six bananas, one lemon, 2 oz. sugar, one teacup water, enough crust to cover the pie-dish.

Banana Trifle.

Six bananas, one orange, half lemon, six sponge cakes, strawberry jam, ½ pint of good custard, ½ pint of cream, ½ oz. of Pistachio nuts. Peel the bananas and cut them into quarters lengthways, slice the cakes thinly, spread each piece with jam. Peel the orange and lemon, cut into small dice, taking out all pips. Grate the lemon rind. Put a layer of the cakes into a glass dish; put on them a spoonful or two of custard, next a layer of bananas and few pieces of orange and lemon and grated rind. Continue this till the dish is full. Put whipped cream on top; shell and shred the nuts and stick them in rows over the cream. Serve as cold as possible.

MARKET GARDENING.

SWEDE TURNIP.

Although considered a farm crop suited to the needs of stock, swede turnips, when taken at the proper stage, form a welcome addition to the list of vegetables that may be considered as profitable to grow.

Turnips thrive under identical conditions of soil and climate, but swedes can safely be thinned out to greater distances, whilst the distances apart of the drills require to be somewhat greater. Swedes lend themselves to storage where such is desired, but this should be undertaken only where a favourable situation is procurable.

Sow in early autumn. The varieties recommended are—Elephant or Monarch; Champion Purple Top; Laing's Garden Swede.

TOMATOES.

A rich friable, or sandy loam is necessary where heavy crops are desired, but at the same time early yields may be obtained from comparatively poor and medium quality land. The preparation of land as previously mentioned for onions may be applied to this crop.

Seed should be sown during early spring and summer in shallow boxes, and covered with a fine sprinkling of loamy soil, which should be kept moderately moist. When the plants are sufficiently strong they may be transplanted out into their permanent positions, care being taken that they be planted slightly deeper in order that the roots may be able to better assimilate soil-moisture. Plants should be placed not less than 2 ft. apart with a space of 4 ft. between the rows.

Special treatment and training are required for the production of large sized fruit.

Where practicable, the vines should be trained to trellises about 5 ft. high. When allowed to spread on the ground a large proportion of the fruit is lost through rotting during rainy weather. Heavy mulching of the surface is of value, particularly in dry districts.

It may be impossible on large areas to erect the necessary trellising, but an effort should be made to keep the vines off the ground and allow sunlight and air free play through the foliage.

Tomato plants are susceptible to various diseases, which are difficult to keep in check. Experience has proved that a moderate and regular supply of water develops less rotten fruit than lightly or heavily watered plants; frequent aeration of the soil by cultivation is necessary during the growing period. Exposure to the sun also tends to increase disease, and methods of growth that will allow the foliage to shade the fruit assist in checking this.

When carrying a heavy crop it is advisable to apply liquid manure occasionally and if possible mulch the plants. Liquid manure is best applied just before the flowering period.

Burn all fruit showing signs of disease.

Varieties recommended are—Chalk's Early Jewel; Burwood Prize: Hurst's Buckeye; Spark's Earliana; Trucker's Favourite.

TURNIPS.

To obtain a good crop of this useful vegetable, it is necessary that rapid growth be made, therefore rich soil and an open situation are of main importance. The seed should be sown thinly in drills and the plants hoed out to the proper distance apart when young. In cool climates sowings may be made nearly the whole year, but in hot, dry districts, late summer and autumn sowings are recommended. Spring sowings should be limited, as the plant soon runs to seed. Turnips are frequently attacked by aphis, which, if not checked, spreads with alarming rapidity and will soon exterminate the whole crop. Kerosene emulsion or a strong solution of tobacco water will usually effectively deal with this pest, if applied in the early stages. Cabbage-fly, which also attacks turnips in warm weather, may be kept in check by an application of a solution of Paris green, care being taken that this remedy is used only on the immature plants.

The varieties most used are—Purple Top Milan, White Milan, White Stone or Snowball, Red American Stone, and Orange Jelly.

(TO BE CONTINUED.)

A VALUABLE JOURNAL.

Renewing his subscription to the Journal, a Yandina farmer writes (14th January, 1930):—". . . . I thank you for the past year's issue and I assure you it's a very valuable journal to me, and I appreciate the amount of work put into it. . . . ."

Orchard Notes for April.

THE COASTAL DISTRICTS.

In the Orchard Notes for March the attention of citrus growers was called to the necessity of their taking the greatest possible care in the gathering, handling, sweating, grading, and packing of the coming crop of fruit, as the returns for the labour expended in the upkeep of their orchards will depend entirely on the condition in which the fruit reaches the market. Many growers fail to realise the very important fact that the success of fruitgrowing does not depend merely on the proper working and management of the orchard, so essential for the production of a good crop of high-class fruit, but that the manner in which the fruit is handled and placed on the market is of even greater importance. In no branch of fruit culture is this more evident than in the case of citrus fruits, as no fruit pays better for the extra care and attention necessary to enable it to be marketed in the best possible condition. Every season there is more or less loss in the consignments sent to the Southern markets, the percentage depending mainly on the weather conditions, the loss in a wet year being much heavier than that in a dry year.

A very large percentage of the loss is due to what is known in the trade as specking—viz., a rotting of the fruit caused by a mould fungus, and this loss can be prevented, provided necessary precautions are taken. Although this matter was dealt with last month, it is of such vital importance to our citrus growers that it is necessary to again refer to it.

In the first place, growers must clearly understand that specking cannot occur on perfect fruit, the skin of which is free from injury of any kind. The fungus causing specking can only obtain an entry into the fruit through an injury to the skin; it will thus be seen that the remedy for specking is to take every possible care not to injure the skin of the fruit in any way.

Few growers realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions, when the skin is full of moisture and so tender that the least sign of rough handling causes serious injury, as the cells of the skin are so brittle that they are easily broken, and when so broken a ready means of entry for the mould fungus is provided, and specking follows in due course.

The remedy for specking is in the hands of the grower, who must learn so to gather, handle, and transport the fruit from the orchard to the packing-shed that it does not receive the slightest injury, and further, that when it has reached the packing-shed it must be carefully placed in shallow bins or on trays and be exposed to the air for at least seven days, so that the surplus moisture in the skin may be removed, and the skin thus becomes toughened and less easily injured. This drying of the skin is known as "sweating," and during the time the fruit is being sweated it should be kept under observation, and all fruit showing signs of specking or injury from fruit flies, sucking or boring insects, mechanical injury or bruising, should be removed.

In order to prevent injuring the skin when gathering, all fruit must be cut and not pulled. Gloves should be used to handle the fruit, and when cut it should be placed in padded baskets or other suitable receptacles. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. At the same time, if the injury is only slight, it can be sent to a local market for quick sale.

For Southern markets only perfect fruit should be selected, and further, it must be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case. The cost of cases, freight, and marketing is now so high that only the best fruit will pay to send to the Southern States, and even the best fruit must be properly graded and packed in order to produce the best returns.

All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention, as from now till the next rainy season the ground must be kept in a thorough state of tilth and free from weeds in order, in the first place, to retain moisture in the soil, and, in the second, to enable birds, ants, and predaceous insects to get at and destroy the pupæ of fruit flies and other pests harbouring in the soil.

Banana and pineapple plantations must be put into good order, and kept free from weed growth.

Land to be planted with trees should be got ready, as, if possible, it is always advisable to allow newly cleared land time to sweeten before planting.

Farm Notes for April.

FIELD.—Those areas already lying in fallow for subsequent sowing with wheat should be kept in good tilth, using field implements that have a stirring effect in preference to those which tend to reverse the surface soil. The surface should never be allowed to cake; consequently all showers must be followed by cultivation, as soon as conditions will permit of teams and implements working freely.

Early fodder crops, such as barley (skinless or Cape) and certain varieties of wheat may be sown during April. Growers of winter fodders will be well advised to study the article dealing with dairy fodder plots which appeared in February, 1922, Journal.

Potatoes should now be showing good growth and must be kept free from all weed growths by means of the scuffler. If sufficiently advanced, and any doubt exists as to the prevalence of blight, advantage should be taken of fine weather to give a second spraying of "burgundy mixture," a calm and somewhat cloudy day being chosen if possible for the spraying.

Where land has been previously well prepared, lucerne sowing should be carried out this month, and intending growers of this fodder will be well advised to ascertain the germinating qualities of seed submitted to them for purchase. The difference between a good and bad "strike" is often traceable to the poor class of seed sown.

Maize and cotton crops should now be in the harvesting stage, and, once matured, are better in the barn than the open paddock, where weevils and other insects are usually prevalent at this season of the year.

Root crops sown last month should now be making fair growth, and during the early period of such should be kept free from weeds, and where necessary, thinned out. Sowings of mangels, swedes, field carrots, sugar-beet, and rape may still be made where conditions of moisture will permit.

As the sowing season is close at hand for certain varieties of wheat—i.e., those which require a fairly long period to develop in, every effort should be made to bring the seedbed into the best possible tilth and to free it from foreign growths of all kinds. The grading of all seed-wheat is strongly recommended, and growers who favour certain varieties should adopt a system of seed selection from prolific strains with a view to the raising of larger quantities of pure typical grain for ultimately sowing in their larger fields.

Pickling of wheat to prevent smut (bunt) is necessary. Germination tests should be carried out prior to commencing seeding operations.

Sorghums which have matured and are not immediately required as green fodder should, wherever possible, be conserved as ensilage to provide for a reserve, to tide over the period when grasses and herbage are dry. Succulent fodder of this description is the best possible form of insurance against drought, and for maintaining dairy and other stock in thrifty condition.

THE CONTENTED SPIRIT.

If you will secure a contented spirit you must measure your desires by your fortune and condition, not your fortunes by your desire; that is, to be governed by your needs, not by your fancy; by Nature, not by evil customs and ambitious principles. He that would shoot an arrow out of a plough, or hunt a hare with an elephant, is not unfortunate in missing the mark or prey, but he is foolish for choosing such unapt instruments; and so is he that runs after his content with appetites not springing from natural need, but from artificial, phantastical, and violent necessities. These are not to be satisfied; or, if they were, a man hath chosen an evil instrument towards his content: Nature did not intend rest to a man by filling of such desires. Is that beast better that hath two or three mountains to graze on, than a little bee that feeds on dew or manna and lives upon what falls every morning from the storehouse of Heaven, clouds and providence? Can a man quench his thirst better out of a river than a full urn, or drink better from the fountain when it is finely paved with marble, than when it swells over the green turf? Pride and artificial gluttonies do but adulterate Nature, making our diet healthless, our appetites impatient and insatiable, and the taste mixed, phantastical, and meretricious. But that which we miscall poverty is indeed Nature; and its proportions are the just measures of a man, and the best instruments of content. —Jeremy Taylor.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	March, 1930.		April, 1930.		MOONRISE Mar., 1930.	MOONRISE April, 1930.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	5.48	6.23	6.5	5.46	a.m. 5 57	a.m. 7.34
2	5.48	6.22	6 5	5 45	6 50	8.33
3	5 49	6 21	6 6	5.44	7 46	9.38
4	5.49	6 20	6 6	5.43	8 42	10 41
5	5 50	6.18	6 7	5 42	9.40	11.45
6	5.50	6 17	6.7	5 41	10 41	p.m. 12.47
7	5 51	6.16	6.8	5.40	11 45	1.45
8	5.51	6.15	6.8	5.39	p.m. 12 48	2.37
9	5.52	6 14	6 9	5 38	1 51	3 21
10	5 52	6.13	6 10	5.37	2 54	3 58
11	5 53	6.12	6 10	5 36	3 52	4.43
12	5.54	6.10	6 11	5.34	4 43	5.7
13	5 54	6 9	6 11	5 33	5.24	5 39
14	5 55	6.8	6 12	5 32	6 2	6.14
15	5 56	6.7	6.12	5 31	6 36	6.50
16	5 56	6 6	6.13	5.30	7.10	7.30
17	5 57	6 5	6 13	5.29	7 44	8.17
18	5 57	6 4	6.14	5.28	8.18	9.7
19	5 58	6.3	6.14	5 27	8 55	9.59
20	5.58	6 2	6.15	5 26	9.39	10.56
21	5.58	6.1	6.15	5.26	10.27	11.51
22	5 59	6 0	6 16	5.25	11.17	...
23	5.59	5 59	6 16	5.24	...	a.m. 12.45
24	6.0	5.58	6.17	5.23	a.m. 12.11	1.39
25	6 0	5.56	6.17	5 22	1.5	2.34
26	6.1	5.55	6.18	5.21	1 57	3 29
27	6 1	5.54	6 18	5 21	2.54	4.25
28	6.2	5.52	6.19	5.20	3.50	5.23
29	6 2	5 50	6.19	5.19	4.46	6.23
30	6.3	5.48	6.20	5.18	5.40	7.26
31	6.4	5.46	...	...	6.35	...

Phases of the Moon, Occultations, &c.

8 Mar.	☾	First Quarter	2 0	p.m.
15 ,,	○	Full Moon	4 58	a.m.
22 ,,	☽	Last Quarter	1 12	p.m.
30 ,,	●	New Moon	3 46	p.m.

Perigee, 13th March, at 6·24 a.m.
Apogee, 25th March, at 3·24 a.m.

It will be interesting to notice the near approach of Jupiter to the Moon on the 7th, before they set, about 10·15 p.m. The nearest apparent approach in the line of sight will be at midnight, when they are below the horizon.

The occultation of Iota Geminorum (magnitude 3·8) will occur shortly after 6 p.m. on the 10th. It will last longest (about an hour and a-half) at places 33 degrees south, and the star will remain hidden by the Moon longer in the south of Queensland than in the north. The time at Cairns will be reduced to about one-half. Four hours later another star in Gemini (magnitude 4·9) will be occulted for a longer period in northern Queensland.

Mercury will rise at 4·2 a.m. on the 1st, and at 4·45 a.m. on the 15th.

Venus will rise so soon (21 minutes on the 1st and 31 minutes on the 15th) before the Sun, as to be lost in his rays.

Mars will rise at 4·4 a.m. on the 1st, and at 4·27 a.m. on the 15th.

Jupiter will set at 11·28 p.m. on the 1st, and at 10·4 p.m. on the 15th.

Saturn will rise at 1·11 a.m. on the 1st, and at 12·11 a.m. on the 15th of March.

On the 21st, at 10 p.m. the Sun will reach the junction of the ecliptic and the celestial equator—the First Point of Aries—and the point on the horizon at which it sets will be due west.

When the Moon rises on the 28th, it will be seen to have passed to the eastern side of the planet Mars, about three hours earlier.

The occultation of Venus by the Moon on the 31st will, unfortunately, be invisible, on account of their nearness to the Sun.

6 April	☾	First Quarter	9 24	p.m.
13 ,,	○	Full Moon	3 48	p.m.
21 ,,	☽	Last Quarter	8 8	a.m.
29 ,,	●	New Moon	5 8	a.m.

Perigee, 9th April, at 9.12 p.m.
Apogee, 21st April, at 10·54 p.m.

On 1st April Mercury and Uranus, on the far side of their orbits, will be almost in a line with the Sun, but not exactly behind it. They will both be on its southern side, Uranus at a distance of one diameter of the Moon and Mercury at double that distance. Mercury will be passing eastward of the Sun but Uranus will be left on the western side.

The Moon will be passing Jupiter at midday on the 4th when it will be interesting to look for the planet with binoculars at a distance of 4 degrees, or eight times the diameter of the Moon to the southward.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

Queensland Wheat.

QUEENSLAND has harvested her 1929 wheat crop and the deliveries of grain to the State Wheat Pool are practically completed. The result of the crop as a whole is highly gratifying. We are now faced with early preparations for the 1930 harvest.

In a recent report to the Minister of Agriculture and Stock, Mr. Harry F. Walker, the Director of Agriculture, Mr. H. C. Quodling, calls attention to the fact that within the Darling Downs and Maranoa districts, the recognised wheat belt of this State, considerable areas of land are lying idle which could be brought under grain production.

This State for the next few years has little to fear from over-production of wheat, for we are as yet far behind in our own requirements which approximate 5,000,000 bushels yearly. It is generally an uneconomic policy to buy from our neighbours that which we are capable of producing ourselves, but for years past this is what Queensland has been doing in order to supply her requirements in a class of grain which she can produce equal in quality to that of any other State in the Commonwealth.

Although wheat production is not at present Queensland's main rural industry, wheat is a primary product to which more attention could be given for the general welfare of the community. In this State, it is customary for the most progressive wheatgrowers who apply approved methods of cultivation, to commence summer fallowing operations immediately following on the previous harvest, and already most of these growers have made considerable progress in this direction. It is, however, to a small minority who have as yet made no efforts in the direction of preparing their land that the advice to get busy has been tendered.

From a long series of experimental trials conducted by the officers of the Department of Agriculture, it has been shown that to attain success in wheatgrowing under average Queensland conditions, it is essential that early initial cultivation of areas intended for wheat should be carried out, or at least very far advanced, before the rainy season begins. The copious rainfall usually experienced between the months of December and April is thus more readily absorbed instead of being diverted or else almost entirely lost where compacted soil surfaces are existent.

On our black soils of the Darling Downs rain has the effect of rapidly breaking down and rendering friable a soil which, under dry conditions, is difficult to cultivate, but the use of improved implements and power has facilitated early and rapid cultivation and completely changed the old order of things. Once the fallows have received the benefit of good rains they should be worked immediately conditions permit. This practice controls weed and volunteer growths, and tends to create the soil mulch absolutely necessary where moisture is to be conserved.

Wheat favours a firm seed-bed and the first 4 inches of cultivated soil is that from which it largely draws its substance. Given a retentive sub-surface, in which the moisture has been conserved by a well-worked mulch, the wheat plant will carry on to maturity with the aid of occasional showers. Early and efficient cultural methods, combined with the selection of proved satisfactory varieties of wheat and seasonable sowing, are important factors in successful grain production; the rest can very safely be left to ordinary seasonal conditions.

Our Cotton Future.

AS has been previously indicated in statements which have been made on behalf of the Government since its assumption of office, very careful consideration has been given to the future of the cotton industry. An exhaustive examination has been made of the present position of the industry and of its future prospects. It has been ascertained that the yield per acre compares more than favourably with the yield per acre in the United States. The average quality of Queensland cotton is superior to that of the American crop, its average value being at least 85 points above American middling. The cost of production in Queensland also compares very favourably with that in the United States. The two directions in which the Queensland cotton growing industry has been handicapped, however, are in the cost of picking and the cost of ginning.

During the period of its establishment the industry has been assisted by Government guarantees and bounties, and it is obvious that such bounties cannot continue indefinitely. It has been found necessary, therefore, to devise means which will enable the industry to stand on its own feet under the protection of a tariff. A further bounty period may be necessary, but it is the desire of the Government to so arrange that during the remainder of the present bounty term readjustments will be made which will enable the industry to so reduce costs as to permit of its being carried on on a proper economic footing.

The ginning and oil milling have so far been carried out by the British Australian Cotton Association. As is generally known, this concern established six ginneries at several centres in Queensland and also an oil mill at Whinstanes, near Brisbane, the capitalisation of the concern being in the region of £560,000 Unfortunately, some of the ginneries were erected in wrong locations. A large amount of money was spent by the concern in the initial stages on other than fixed assets, and generally the ginning rate of 1⅛d. per lb., which it has been necessary for the company to charge the growers, has been an onerous burden on the industry. Such a ginning rate is very much in excess of the charge which obtains in the United States; and this excess charge accounts partially for the necessity which the growers have been under in asking for a continuance of Commonwealth bounties. A further important point concerns the efficiency of the Queensland ginneries in comparison with modern ginneries operating in America. An extensive development has taken place in recent years there in connection with the handling and cleaning of seed cotton prior to ginning, and the absence of this cleaning and handling equipment in the Queensland ginneries so operates as to necessitate unnecessarily fine picking in the Queensland cotton fields, which factor accounts for some of the excess cost in this phase of the industry. This handicap is being carried by the industry in addition to the burden of over-capitalisation of the ginneries and oil mill plant.

With the object of easing these burdens on the grower and placing the industry on a co-operative basis, the Cotton Board entered into negotiations with the Cotton Association for the acquisition of its physical assets in Queensland. The negotiations culminated in an agreement between the parties concerned by which the Board takes over the ginneries and oil mills at a valuation mutually agreed upon.

Commenting on this development recently, the Minister of Agriculture and Stock, Mr. Walker, said that the reconstruction of the ginneries and oil mills and the cheapening of the cost of picking and ginning which have been handicapping the industry, were necessary preliminaries to the carrying out of further important policies which the Government had formulated for its development. He forecast further Federal and State action towards stabilising the industry, and of establishing it firmly as one of our staple rural enterprises.

Questioned as to what his opinion was with regard to the extent of land available in the State for increased cotton production, Mr. Walker quoted from a report on the subject which he had called for from the chairman of the Land Administration Board (Mr. W. L. Payne), and which is summarised as follows:—

> In the opinion of the Land Administration Board, if prices were stabilised over a period of years at a figure that would make cotton growing a payable proposition, greatly increased production of cotton in Queensland would immediately result.
>
> Apart altogether from the question of new land settlement, there is at the present time in Queensland an immense area of land held under selection tenures which is eminently suited for the production of cotton. Evidence given before this Board in its various investigations establishes clearly that if the prices were stabilised at a rate attractive to growers, the production of cotton in Queensland would be increased at least tenfold. Everything depends on the stabilised rate being satisfactory and being applicable for several years in succession.
>
> It is pointed out that if settlers have no guaranteed price for successive years they must utilise their lands for some industry that will give them an assured annual return, and hence it is that hundreds of thousands of acres in the Upper Burnett and Callide district alone, which are eminently suited for cotton production, are now being utilised for dairying.
>
> As regards new land settlement, an area of 1,475,000 acres, being the remaining available land in the Upper Burnett and Callide district, will be opened for selection in the course of the ensuing twelve months. Much of this land is suited for cotton, and would doubtlessly be utilised for growing it if prices were stabilised.
>
> A very large area, comprising hundreds of thousands of acres in the prickly-pear belt of the State, situated within easy range of existing railways, is also well suited for the production of cotton. The lands are held under prickly-pear lease tenure, and are resumable at any time for closer settlement, without compensation. These lands could be resumed and utilised for cotton production if the prices obtainable for that commodity were satisfactory to the growers and were stabilised over a period of years.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director, Bureau of Sugar Experiment Stations.

PART IV.

(b) Review of the Industry since Federation.

It was stated in the last article that the federation of the Australian colonies brought tremendous changes to the Queensland sugar industry. It will now be attempted to show how these changes came about, and why.

The Federal idea of the bringing together of the colonies was not by any means a new one. As early as 1852 Dr. Lang, of New South Wales, advocated a great federation of all the colonies of Australia, and in 1857 the patriot Wentworth sought to bring about the creation of a Federal Assembly, and later in the same year the Victorian Assembly is stated to have appointed a select committee to consider the question, and the need for such a Union was unanimously affirmed. From time to time thereafter the matter was brought up, and the first National Australasian Convention sat in 1891. The Bill then drafted left out Queensland, Western Australia, and New Zealand. Nothing, however, was done then, and it was not until 1897-8 that a Convention was held which prepared the document that finally became the Constitution of Australia. At this Convention, Queensland was not represented, although Sir Samuel Griffith had been taking a very keen interest in the matter, but in 1899 when the subject was put to the people, Queensland voted for federation, but its majority was the smallest of any of the States, amounting to only 7,492 votes, whereas Victoria's majority was 142,848. There was not a great deal of opposition from the sugar-growers to federation, what little there was came principally from the older individual planters and millowners, who were concerned at the loss of Kanaka labour which they knew would come if federation was carried; for it was quite understood that if Queensland entered the federation the black labour system would end, and that the Commonwealth would make provision for protecting the sugar industry when it was deprived of labour from what was characterised as "an admittedly undesirable source." There is no doubt that this class of labour was always more or less distasteful to the majority of Australians.

The Commonwealth of Australia came into being on the 1st day of January, 1901, on the first day of the first month of the new century. From that time the colony of Queensland became a State, and the Commonwealth Government began to take a large part in the control of the sugar industry.

At this time there were still a few of the old type of sugar planter owing small mills who could see nothing but ruin ahead in the entire replacement of the Kanaka by white labour. Most of these men, perhaps all, have now passed away; few of them lived long enough to witness the great expansion of the industry in the years since federation, and the upsetting of all their forebodings of calamity. Still they were men of the old school trained in their beliefs, but the present day sugar-growers are of quite a different type. Even before the days of federation the new spirit was being developed by the establishment of Central Sugar Mills.

The first change brought about by federation was that the sugar markets of the various States were now free to Queensland, while a protective duty of £6 per ton was imposed by the Commonwealth Parliament on all foreign cane sugar while, as the beet sugar bogey was even then powerful, the duty in its case amounted to £10 a ton.

The Commonwealth authorities now had to consider the best method of bringing the sugar industry under white labour. It was generally considered by those persons who had given thought to the matter that the Kanaka labour had been eminently serviceable and of considerable use in opening up the country for sugar-growing, but the time had arrived, in view of the general opinion of Australia as to coloured labour, when a change had to be made. Before any legislation was introduced the Prime Minister of the Commonwealth, Mr. Barton, commissioned Dr. Maxwell, Director of Sugar Experiment Stations, to report on certain factors relating to the sugar industry in Queensland and New South Wales. In that report, attention was drawn to the fact that estates were being cut up and divided into small farms, more particularly since the advent of the Central Sugar Mills, which had brought about a condition of things that was unique and in a large measure peculiar to the Australian cane sugar industry.

The report went on to say:—

> "The most highly important economic and social result of this change is found in the circumstance that the ownership and occupancy embrace a large number of strong, responsible, and progressive white settlers, with families of coming men and women, who are being planted over the sugar-growing areas. Those settlers are furnishing the cane which keeps the mills in operation, and it is not only apparent that the maintenance of the sugar industry, but also the settlement of the country, is to be very chiefly in their hands. At this time there are 2,610 canegrowers in the State of Queensland, with an average area, per grower, under sugar-cane of 42·6 acres. . . . As labourers, working for hire, many of those settlers would never have been found on the soil; but as free men, with a personal interest in the occupancy of the lands, they are the hardest performers of given kinds of work in the field; and by their labour they have already, to a very notable extent, modified the exclusive employment of subject labour, and in localities where hitherto the white labourer had hardly been found. As a result of this white settlement, the following table sets forth a decrease in the number of Pacific Islanders employed, yet a simultaneous expansion in the sugar production:—

Year.	Acres of Cane Crushed.	Tons of Sugar Made.	Pacific Islanders in Queensland.
1885	38,557	55,796	10,755
1890	40,208	68,924	9,689
1899	79,435	123,289	8,826

> "If the present natural course of white settlement is not interrupted by any untoward economic changes, there is no apparent ground for considering that it will not go on. There is abundant room for more men and families upon the areas suitable for cane culture and contiguous to manufacturing centres.
>
> "At the present time the labour power furnished by the canegrowers themselves, and by their families, is utterly inadequate to produce the bulk of cane demanded by the mills to keep them in operation. Hired labour is, therefore, engaged to supplement

the work of the growers; and not only are the few remaining large planters employers of such labour, but most the farmers pay wages to several hired hands.

"The labour employed embraced Europeans, chiefly of the Anglo-Saxon race; and other races, including the Asiatic, the Hindoo, and the Polynesian. The great majority of the alien labourers engaged in Queensland belong to the South Sea Island tribes.

"Position of the White Labourer.

"By reason of a legislative enactment, known as the Pacific Island Labourers Act, the white labourer in Queensland holds a unique and relatively protected position. In the citation of kinds of labour which the South Sea Islander may perform, the positions of 'engineers, engine-drivers, engine-fitters, blacksmiths, wheelwrights, farriers, sugar-boilers, carpenters, sawyers, splitters, fencers, bullock-drivers, mechanics, grooms or coachmen, waggoners, or household servants' are not included, all these several kinds of employment being reserved for the selection of the white labourer.

"Compensation of the White Labourer in the Field.

"The compensation of the white labourer in the field can be exclusively in wage; or it may be in wage with rations, these including board and lodgment. The latter mode of payment is the more usual. Instead of a fixed wage being paid, work may be undertaken by contract, which may or may not be made to include rations.

"In furnishing examples of the actual compensation of white labourers in the canefields of Queensland, these will be arranged in three main divisions in order to observe what differences, if any, obtain in the respective districts. It is explained that the examples given represent averages of conditions in subdistricts, and cover very ample ground, and are thus typical of the actual situation:—

District.	Number.	Rate of Wages per Week.	Rations per Week.	Compensation per Week.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Bundaberg ..	1 ..	1 0 0	0 7 0	1 7 0
	2 ..	1 1 0	0 8 4	1 9 4
	3 ..	1 0 0	0 7 6	1 7 6
	4 ..	1 0 0	0 8 0	1 8 0
	5 ..	1 0 0	0 7 6	1 7 6
	Means ..	1 0 2½	0 7 8	1 7 10½
Mackay ..	1 ..	1 0 0	0 7 6	1 7 6
	2 ..	1 3 6	0 6 0	1 9 6
	3 ..	1 3 6	0 7 0	1 10 6
	4 ..	1 0 0	0 9 0	1 9 0
	5 ..	1 4 0	0 8 0	1 12 0
	6 ..	1 3 6	0 7 6	1 11 0
	Means ..	1 2 5	0 7 6	1 9 11
Cairns ..	1 ..	1 4 6	0 10 6	1 15 0
	2 ..	1 5 0	0 10 0	1 15 0
	3 ..	1 5 0	0 12 0	1 17 0
	4 ..	1 4 0	0 10 6	1 14 6
	Means ..	1 4 7½	0 10 9	1 15 4½

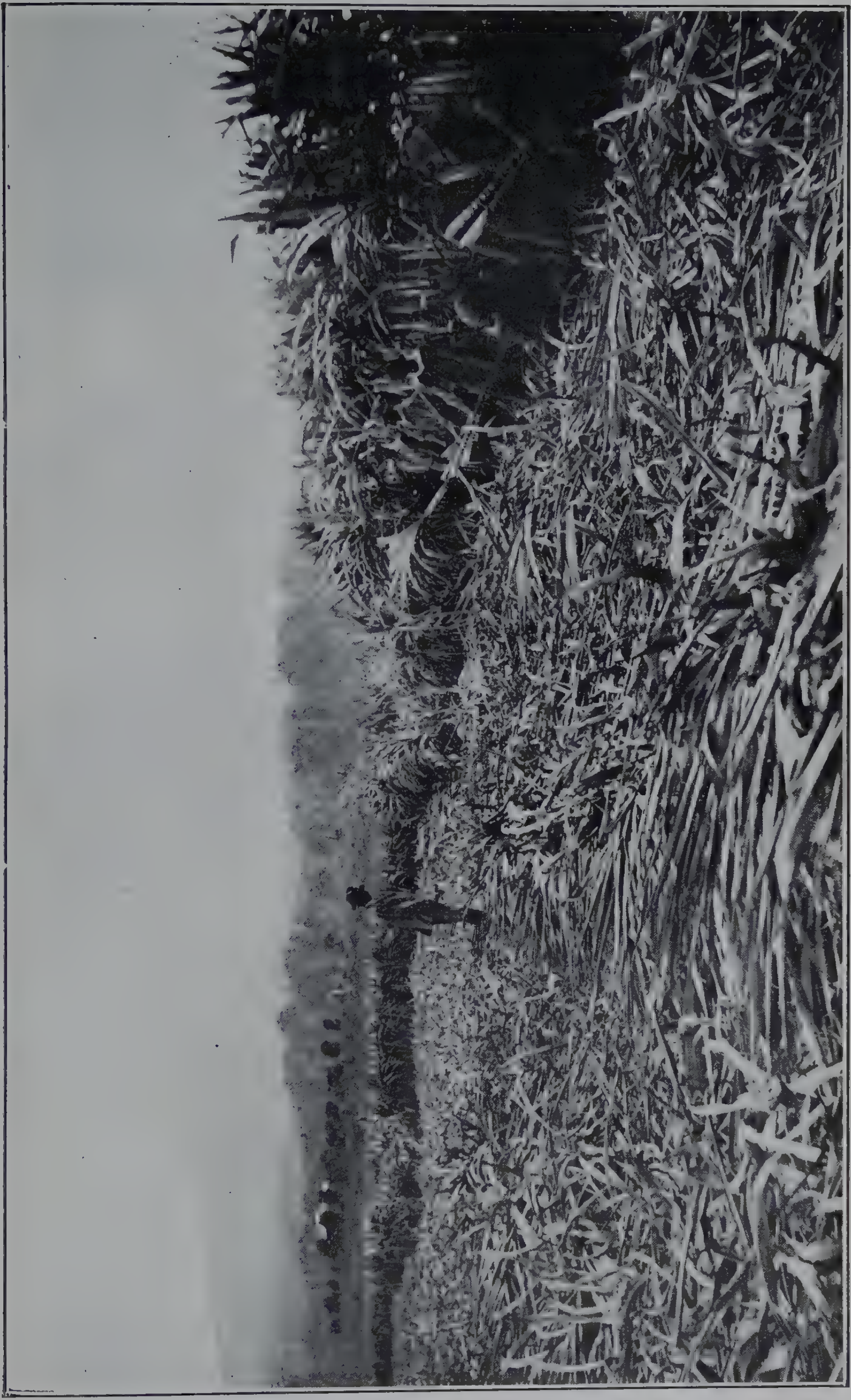

PLATE 69.—WHITE AUSTRALIAN CANE CUTTERS AT WORK, BABINDA, NORTH QUEENSLAND.

The efficency of white labour in Queensland canefields is far superior to that of any class of labour employed.

"The compensation per week, as stated in the outer column, is made up of precise figures taken from business records. The cost of 'rations' is variable, even in the same district, and has had to be approximated, in relation to the wage factor, in the Cairns district.

"From the figures given it is seen that the compensation of the white labourer is 2s. per week greater in the Mackay district and 7s. 6d. per week greater in the Cairns district, than obtains in the district of Bundaberg. It may be of value to note the comparative rates of compensation of mill hands in the same districts. The figures given in this connection state only averages, and they are to be taken as close approximations, and not as precise statements.

WEEKLY COMPENSATION OF MILL HANDS.

Occupations.	District of Bundaberg.	District of Mackay.	District of Cairns.
	£ s. d.	£ s. d.	£ s. d.
Engineers	3 13 4	3 12 4	4 14 0
Boiler Men	1 19 8	2 1 9	2 8 4
Firemen	1 15 9	2 0 8	2 5 4
Sugar Boilers	4 3 6	3 14 0	4 16 8
Clarifiers	1 14 6	1 15 0	1 18 0
Centrifugalers	1 13 7	1 14 0	1 18 0
Cane Carriers	1 9 6	1 12 0	1 16 0
Labourers	1 7 9	1 10 4	1 15 0
Mechanics	2 14 2	2 17 6	3 0 0
Means	2 5 9	2 6 5	2 14 7

"In comparison with the rates paid to white labourers in the field the cost of the indented coloured labourer for the districts of Bundaberg, Mackay, and Cairns, is given as under:—

District.	Cost of Islander per Year.	Cost of Islander per Week.	Cost of Islander per Day.
	£ s. d.	£ s. d.	£ s. d.
Bundaberg	37 2 3½	0 14 3	0 2 4½
Mackay	32 0 10	0 12 4	0 2 0¾
Cairns	36 6 9	0 13 11½	0 2 4

COMPARISON OF AVERAGE COST OF WHITE AND COLOURED LABOUR.

Class of Labour.	Cost per Year.	Cost per Week.	Cost per Day.
	£ s. d.	£ s. d.	£ s. d.
White labour	80 7 10	1 10 11	0 5 2
Polynesian labour	36 14 10	0 14 1½	0 2 4¼

"The Polynesian labourer or 'boy' worked on an average of 59¼ hours per week and the white labourer 57½.

"It is noteworthy that at the time the inquiry was made—viz., in 1901—the co-efficient of value of labour of the white man was highest in the Bundaberg district and lowest in Cairns, while the reverse took place with the coloured labourer. The islander was worth the least and cost the most in the Bundaberg district. This was also found to be the case in New South Wales."

This report was made for the information of the Commonwealth Government, who were then considering in which form they were to provide for the replacement of the Kanaka by white labour.

The problem the Commonwealth had to deal with was to find an equitable means of meeting the general Australian desire for the cessation of coloured labour in the industry, and at the same time make the sugar industry sufficiently profitable to render it easy for the growers to engage white labour for their farms. It was recognised that this could only be done gradually, and that there must be a transition period during which black labour would gradually diminish and white labour increase. How this was done will be dealt with in the next part.

[TO BE CONTINUED.]

Bureau of Sugar Experiment Stations.

ENTOMOLOGIST'S ADVICE TO CANEGROWERS.

By EDMUND JARVIS.

How to Destroy Cane Grubs.

The following points in connection with the control of grubs of our "greyback" cockchafer will be useful to those growers in localities where beetles chanced to make a late emergence, and the work of fumigation has had to be delayed owing to prolonged wet conditions during the month of January and part of February:—

1. Before commencing soil fumigation, make sure that grubs be present by a systematic examination of some of the stools on the area believed to be infested. If finding grubs, make a note of the depth at which they happen to be feeding at the time.

2. Do not start fumigation work immediately after heavy rain, but wait until surplus moisture has drained away, leaving the soil aerated or "open" for the passage of poisonous fumes. Such precedure is imperative when using carbon bisulphide.

3. Whether employing liquid or solid doses of any fumigant the injections should be made, or the chemical buried, just above the level at which the grubs are feeding.

4. Remember that the fumes of carbon bisulphide are highly inflammable.

5. Do not inject bisulphide or paradichlorobenzene too close to stools of young plant cane, or material injury to the leaves may result, especially should the ground chance to be very dry.

6. When using paradichlorobenzene remember that small doses are better than large ones. From 1 to 1½ cwt. per acre should be sufficient for plant crops.

7. After injecting, drilling in, or otherwise burying soil fumigants, the disturbed ground above the doses should be lightly rolled in order to consolidate same.

8. Do not fumigate land broken up by cultivation, until subsequent rain has caused the friable surface to become caked over.

9. Do not defer treatment of the soil until such time as the cane leaves are starting to turn yellow, or appear to be dying.

Protect Your Beneficial Insects.

Do not destroy soil-frequenting larvæ, &c., of insect friends, which are parasitic or predaceous on grubs that injure your cane.

Some of the commonest of these may be easily recognised by the following brief descriptions:—

1. White maggot-shaped inactive larvæ, about an inch long, which when ploughed up are often found attached to dead or dying cane grubs. These spin cocoons, from which emerge digger-wasp parasites.

2. Dark-brown cocoons from ¾ to 1½ inches long, composed of silk hardened to the stiffness of paper. These are often exposed by the plough, and contain either male or female digger-wasp parasites.

3. Shining white maggots, about 1½ inch in length, but more slender than larvæ of wasp-parasites, and able to tunnel with ease amongst soil by means of a pointed beak. These turn into larvæ of Robber Flies, and while underground pierce and suck the juices of cane grubs and other subterranean larvæ.

4. Large yellowish-brown shining and very active larvæ, from 1 to 3 inches in length, and somewhat resembling wireworms in general appearance. They have six small legs close to the head-end and a darker plate with serrated edges on the upper surface of the last body segment. These slippery pugnacious creatures remain about three years in the ground before transforming into ''skip-jack'' beetles. They are inveterate enemies of cane grubs, seizing them with their sharp sickle-shaped jaws, cutting deeply into the body, and greedily imbibing its succulent contents.

CANE PESTS AND DISEASES.

Mr. R. W. Mungomery, Assistant Entomologist, Bundaberg, has submitted the following notes (17th February, 1930) on mole-crickets, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

NOTES ON MOLE-CRICKETS DAMAGING CANE.

During the autumn when a certain amount of planting is being carried on it is customary for us to receive complaints regarding the prevalence of mole-crickets in newly planted fields, these insects having the habit of eating into the centre of young cane shoots, thus producing dead hearts. Several insects have somewhat similar habits, and their effect on the cane plant is the same in all cases—i.e., the death of the young shoot which often results in a blank or ''miss.'' Wireworms and the Black Beetle are two other insects which are notorious for this kind of damage, and since they all occur in the same situations, it is not surprising to find that the damage is attributed solely to one or the other of these insects, whichever first comes under the notice of the grower, whereas often poor strikes are the result of the combined activities of these three pests.

Mole-crickets differ greatly in appearance from the ordinary cricket, since they are possessed with very strong front legs, which are eminently adapted for burrowing in the ground. These front legs are fitted with teeth somewhat like a saw, and these appendages bear a striking resemblance to the hands or feet of a mole, hence the name of these insects. With these front legs they are capable of cutting through the underground stems and roots of grasses and of burrowing to great depths in the soil.

The mole-crickets most common in this locality are about 1¼ to 1½ inches in length, and are of a light brown colour. They are sometimes found flying into houses at night, being attracted by the lights. They have two pairs of wings, a small front pair which, when the insect is not flying, are folded over a larger hind pair. These hind wings fold up in a manner similar to a fan and project over the end of the body.

When they are active in a field, their presence can readily be ascertained by their burrows, which can be seen by the disturbed surface, radiating in all parts of the field. Eggs are laid throughout the spring months, in an oval-shaped earthen chamber at a depth of about 8 inches. These eggs hatch out about a month later, so that these insects are present in great numbers during the summer and autumn months.

Control.

These crickets are kept in check under natural conditions by a small black and white striped wasp, which paralyses them and lays an egg underneath the front leg at its junction with the body. The wasp larva which hatches out from this egg feeds at the expense of the cricket which it ultimately kills. These wasps may often be seen scouting in freshly dug trenches for any crickets that may have been exposed during digging operations.

Despite this natural check, crickets are sometimes so plentiful as to cause annoyance in newly planted cane fields, and this is usually obviated by the time and method of planting. Do not plant with cane, fields that have recently been grass paddocks, or fields where paspalum grass has been allowed to grow in profusion, for crickets are often very plentiful in such cases, especially is this so if the area is normally a wet piece of land. Wet fields should be well drained and the cane planted with a minimum of covering, so as to secure a strike as quickly as possible.

Crude napthalene placed in the soil near the plant is reported to be very efficacious in driving away these pests. This chemical has a slight retarding effect on germination, but once the cane is up and growing, it has no harmful effect on subsequent growth.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report on the effect of prolonged wet conditions on the fumigation of cane-grubs, &c., January to February, 1930 from the Entomologist at Meringa, near Cairns, Mr. E. Jarvis:—

Continual Wet Weather Delays Cane Grub Fumigation.

The present season, which has been marked by the occurrence at short intervals of unusually wet conditions, offers much food for thought regarding the particular form of cane grub control which at the present time is occupying the thoughts of many of our growers.

On account of rainy weather experienced throughout the month of January, and its continuance to date (13th February) it has not only been out of the question to attempt starting fumigation work on soils of a heavy nature, but also inadvisable to treat even volcanic high lands.

Since the first emergence of cane beetles about the beginning of last month, only four dry days have been recorded at Meringa Station, while the precipitation here during January was no less than 37.35 inches—viz., 21.12 inches more than the average rainfall for this month registered for the district of Cairns during the last forty-six years.

Notwithstanding the abnormal climatic disadvantages experienced throughout January, however, it appears likely that similar adverse conditions may obtain until about the middle of February, since the rainfall to date (13th instant) for this month at Meringa has been 9.92 inches.

Grub fumigation cannot be carried out successfully until a spell of a few dry days has allowed time for excessive moisture to drain away. When this happens, the water which during wet weather fills the spaces between the tiny soil particles is gradually replaced by air, and the land is then said to be "open," that is to say aerated; the amount of air present depending, of course, on the size of the larger particles which make up what is known as the skeleton of the soil.

It follows then, that during seasons like the present there is always a possibility that our growers may be powerless to stop grubs of the greyback cockchafer from doing serious damage to cane roots throughout the period occupied by the second, and a portion of their third larval instars of development. Unless such injury can be prevented before or just after these larvæ have reached the third stage of growth, enough damage has usually been done to counterbalance much of the benefit likely to be derived from fumigation of the soil. When unable, through any cause, to treat grub-infested land during January there is always a likelihood, also, even in years of average rainfall, that such fumigation may be stopped or even prevented by the setting in of the wet season.

In cases where this form of control work may have been unavoidably delayed until about the end of January, it is worth noting that young cane plants from 18 inches to 2 feet 6 inches high, growing on well-drained land can often be successfully fumigated by using paradichlor. in dry crystalline state, as in the event of rain falling a few hours after treatment, volatilisation from the nodules, although held in check temporarily while the soil continues water-logged, becomes operative again directly excess of moisture has drained away.

On such land, then, where the cane leaves have not met between the rows, thus allowing the sun to dry the surface soil, sufficient time is afforded between occasional wet spells for the paradichlor. to do its work, seeing that when applied in a crystalline form volatilisation even from injections of one-eighth of an ounce, remain operative in aerated soil for about three weeks or longer, and being practically insoluble in water do not lose weight during wet weather, the effect of which is simply to check evaporation of the chemical until such time as the weather clears up again and leaves the ground open for further permeation of the toxic fumes.

The lesson we hope to learn, however, from the present possibility of continued wet conditions interfering with grub fumigation work is the desirability of undertaking fuller investigation regarding certain effective methods of grub control which are likely to operate independently of adverse climatic influences.

Collecting Grubs and Beetles—A Common-sense Remedial Method.

In view of the possibility of our rainfall next season being of somewhat similar intensity to that experienced during the years 1909-11, 1915-17, and 1920-21—at which times the annual rainfall far exceeded 91 inches (average for Cairns district) —it appears advisable to consider the advantages likely to be derived next year from an organised campaign against our greyback cockchafer.

In the first place, it will be only fair to allude very briefly to work being done in this direction in other countries, where cane growers are faced with a problem very similar to our own—viz., the fight against various species of scarabæid grubs which feed upon the roots of cane and other plants. It is a mistake to assume, as some do, that because Australia happens to be a continent, attempts to control our indigenous insects, either by common-sense or biological methods, must necessarily prove of no avail. In Southern Central Europe, for instance, entomologists have found after fifteen years of investigations on the economy of *Melolontha melolontha*—a cockchafer beetle of practically similar size, habits, and longevity to our own greyback—that collecting these insects is still the best artificial measure known to scientists.

Referring, on the other hand, to an insular situation or habitat, we find that Mr. E. H. Barrow, the Entomologist in Porto Rico, reports as follows:—"The chief method of checking the numbers of lachnosterna (white-grubs) in Porto Rico is the collecting of larvæ and beetles" (Jnl. Dept. Agric. Porto Rico VIII., No. 2, pp. 22-26, Ap. 1924). In connection with such control work he states:—"The numbers of beetles were decreasing up to the date when collecting was stopped, and began to decrease when the collections were again made."

I may mention that beetles of the genus *Lachnosterna* much resemble our "Frenchi" cane beetle in size and appearance; while their white-grubs are like our own in general form, coloration, and root-eating habits.

Again, in Mauritius during 1925, we are told by their Chief Entomologist, Mr. d'Emmerez de Charmoy:—"The collecting of *Lachnosterna* beetles was continued in 1923-24 on the same lines as in previous years, a total of 52,000,000 insects being collected during the year." (Rev. Agric. de L'Ile Mauritius, No. 19, pp. 388-390).

In the Philippines, where beetles are collected by shaking them from the trees, in a manner very much like that adopted in the Herbert River district, such capture of both the beetles and grubs by hand "is considered the best method of control, and especially recommended."

Many other illustrations of the advantages resulting from the practice of this common-sense remedy could be quoted, from such countries as America, Russia, France, &c. As already pointed out in previous reports, Queensland canegrowers should never lose sight of the fact that in problems such as that now confronting us, entomologists have always considered ideal control methods against cockchafer beetles to be essentially those by which we succeed best in capturing or destroying as many females as possible, before they have had time to deposit eggs.

At various farmers' meetings, I have more than once stressed the importance of collecting beetles and grubs of the greyback cane beetle (*Lepidoderma albohirtum* Waterh.), but, whilst consistently advocating this common-sense remedy, wish it to be clearly understood that although urging our farmers to personal effort along such lines of activity, it behoves us also to continue assiduously to investigate those primary forms of artificial and biological control which are most likely to be effective despite any possible occurrence of adverse weather conditions.

LIFE HISTORY NOTES ON THE BANANA FRUIT-EATING CATERPILLAR (*Tiracola plagiata* Walk.).

By MARGARET E. TEMPERLEY, B.Sc.*

The noctuid moth, *Tiracola plagiata* Walk. has a wide distribution in tropical and sub-tropical regions, where it has been recorded as feeding, in the larval stage, on an extensive number of food plants, including many of economic importance.

In Queensland the earliest known reference records it as having been collected by Tryon in a Stanthorpe orchard during the departmental year 1895-1896. It is recorded as "gnawing bananas" at Currumbin during June, 1916, and there are numerous other instances of its having been recorded as a banana pest. An outbreak occurred in the Gympie district in 1919 which assumed plague proportions, the caterpillars attacking a wide range of plants. On this occasion the banana-growers suffered heavy losses. A similar outbreak occurred in 1927 in Southern Queensland, bananas being most heavily infested, and urgent requests were received by the Chief Entomologist from banana-growers and others for assistance in controlling this pest.

Acting under the instructions of Mr. Veitch, Mr. J. A. Weddell, of the Entomological Branch, visited some of the most heavily infested areas in order to collect material and to conduct field investigations and control experiments, while the writer commenced life history studies in the laboratory in Brisbane.

Information regarding the life history of this insect does not appear to have been previously published; certainly there are no Queensland records. The material received from the field and which was to form the nucleus of life history work, consisted of larvæ and pupæ, no larvæ being received at an earlier stage than about the fourth instar. In the initial field trip no eggs were found, neither were any moths observed.

It was hoped that the moths bred from this material could be induced to oviposit under laboratory conditions. As the moths emerged they were released in a small gauze breeding-cage in which young maize plants were placed to act as oviposition sites. The moths all died without laying. Later some moths were confined in small glass jars with inkweed leaves, and three sets of oviposition records were obtained, but the eggs proved infertile and shrivelled up.

However, the writer was extremely fortunate and captured a gravid female moth at Sandgate in June, 1927, which commenced laying within twenty-four hours. The eggs hatched and the caterpillars were successfully reared to maturity. A second failure to obtain fertile eggs from these moths resulted in the termination of the work on account of the inability to procure material for further study.

The results published in these notes are very inadequate as they only embrace the study of a single complete generation, and must therefore be regarded as a preliminary study until an opportunity presents itself of acquiring further details.

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* Miss Temperley, who was formerly on the entomological staff of this Department, completed these notes shortly before her resignation from the Public Service.

The nature of injury occasioned by this pest, its geographical distribution, the records of previous outbreaks in Queensland, and a full list of its food plants were given in detail in the article last month by Mr. J. A. Weddell, entitled "Field Notes on the Banana Fruit-eating Caterpillar."

GENERAL DESCRIPTION.

The Egg.

The egg (Plate 70, fig. 1) is cream coloured with a greenish tinge, and measures about one-forty-second of an inch in diameter. It is dome shaped with a ribbed surface.

The Larva.

The newly emerged larva is about one-sixteenth of an inch long and is greyish in colour, the body being clothed with long fine hairs. The farmer is likely to observe the difference in colouration between the earlier and maturer stages of Tiracola larvæ and to think that two species of caterpillars are attacking his bananas. The young caterpillar has a general body colour of greyish-green to black, but the mature larva is brown.

The full grown larva (Plate 70, figs. 7 and 8) is a khaki coloured, fat, sluggish grub, about 2½ inches long, bearing in the majority of cases two pairs of black markings on its dorsal surface towards the posterior extremity, and a narrow, broken, yellow band on either side of the body.

The Pupa.

The pupa (Plate 71, fig. 1) is shiny mahogany brown in colour, and measures approximately 1 inch in length. It is found in the ground in a cocoon (Plate 71, fig. 2) made of soil particles cemented together.

The Moth.

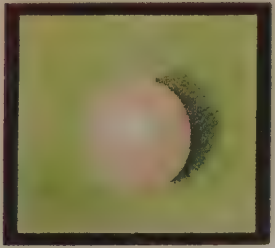
The moth (Plate 71, figs. 3 and 4) is brown coloured, measuring about 2 inches across the wing expanse and exhibits a sex variation in colouration, the female moth being darker and more uniformly coloured than the male. The forewings are mottled, ranging from greyish-brown to chocolate-brown in the female, and from fawn to warm reddish-brown in the male, both sexes having a dark V-shaped marking towards the anterior margin of the wing. The hindwings are dark mole-coloured with a light fringe. The under surface of the wings is light-coloured and is faintly tinged with red.

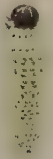
BANANA FRUIT-EATING CATERPILLAR (*Tiracola plagiata* Walk.).

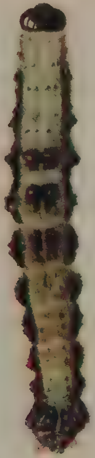
PLATE 70.

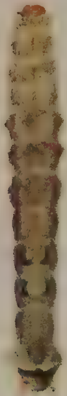
FIG. 1. Egg, × 20.
FIG. 2. First instar, × 8.
FIG. 3. Second instar, × 8.
FIG. 4. Third instar, × 7.
FIG. 5. Fourth instar, × 3.
FIG. 6. Fifth instar, × 2.
FIG. 7. Sixth instar, natural size.
FIG. 8. Sixth instar, natural size, lateral view

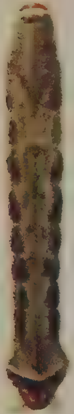
Tiracola plagiata Walk.

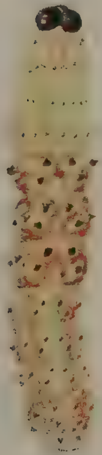


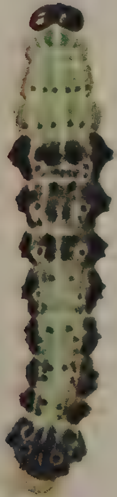


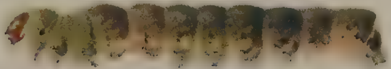












LIFE HISTORY.

Food Habits of Adult.

No opportunity has been afforded of studying the food habits of this moth in nature, but it probably feeds on the nectar of flowers as it flies about at night. In the laboratory the moths were fed on a solution of sugar in water. Moths were seen feeding greedily on the syrup during the day, particularly females about to oviposit.

Longevity of Adult.

Under laboratory conditions females showed themselves to be longer lived than males. In the case of female moths the maximum longevity was seventeen days (see Table II.), while for males the maximum period was fourteen days. The average period for females was thirteen days, while the longevity of male moths averaged eight days.

Mating.

Mating has not been observed in either the laboratory or the field. Moths of both sexes were released in small breeding-cages and were also confined in pairs in glass jars, but none of the eggs laid were fertile. In order to facilitate mating, male and female moths were released in the laboratory overnight for several days, but in all cases the eggs laid failed to develop.

Oviposition.

Oviposition takes place during the night or early morning, in the laboratory the eggs being laid closely together, occasionally superimposed one upon the other. Although inkweed leaves growing in culture solution were placed in the breeding jar, the eggs were laid indiscriminately on the leaves, string, blotting paper, the sides of the jar, and its cheese cloth top. In the field, Mr. J. A. Weddell took twenty eggs which subsequently developed into Tiracola larvæ, on inkweed at Harlin, May, 1927, and in all cases except one the eggs were laid singly on either the upper or lower surfaces of the leaves. In the exceptional case two eggs were found together, one being superimposed on the other.

In the oviposition records of Table II., obtained from unfertilised moths, the maximum number of eggs laid by a single moth was 1,500, while the minimum number was 37. The period elapsing between the date of emergence of the female and the date of oviposition of the first batch of eggs averaged seven days. In the majority of cases after the first batch of eggs was deposited moths laid daily until their death. The maximum period over which eggs were laid was ten days.

A single fertile moth laid 898 eggs more than the maximum number of eggs laid by an unfertilised moth. Fewer batches of eggs were laid by this moth, and the period over which oviposition extended was six days. The dates of oviposition and the number of eggs laid will be found in Table I.

Development of the Egg.

The egg is creamy coloured and opalescent, with a slight greenish tinge. The mandibles are observed about six days after oviposition as a pair of light brownish structures showing very faintly through the chorion or egg shell, usually in an eccentric position. On the seventh day the head capsule can be seen and the development of the mandibles is more pronounced, so that they can be detected with the naked eye. The prothoracic shield is now visible immediately behind the head capsule.

By this time the egg has lost its greenish tinge and has become white. About twelve hours before hatching the dark body of the larva can be seen through the chorion, giving the egg a dark grey appearance.

Emergence of Larva.

About an hour prior to emergence, the larva can be seen moving its mandibles. With these it tears away the chorion, making a semicircular slit at the apex of the egg, the chorion lifting back like a flap, as the larva wriggling its abdomen pushes its way out. In some cases a second slit is made towards the base of the egg, which allows the body of the larva to expand, setae and part of the abdomen protruding before the head has emerged. About twenty minutes elapse between the time the shell is first ruptured until the larva finally emerges. Upon emergence the larva devours the empty egg shell.

Incubation Period.

Eggs laid in June had an incubation period of eight to nine days, the average minimum and maximum temperatures in the laboratory for this period being 61 deg. and 67 deg. respectively. The incubation period for each batch of eggs is given in Table I.

Fertility.

In the case of the fertilised female under consideration, larvæ emerged from the great majority of eggs. Table I. shows the dates of oviposition and the number of eggs laid. In batch (1) the emergence was 100 per cent., while in (2) all the larvæ emerged except six, three of which became caught in the egg shell as they were emerging and died. Larvæ emerged from all the eggs in batch (3). In batch (4) 66 per cent. of the eggs collapsed owing to the fact that culture solution was accidentally spilt on them. Of the remaining 34 per cent., 120 larvæ emerged, while twenty-one of the eggs had ruptured shells but the larvæ failed to free themselves. The eggs of batch (5) showed well-developed head capsules but practically all of them collapsed on the eighth day, possibly owing to mechanical injury.

LARVAL PERIOD.

Behaviour.

The newly emerged larva is extremely active, and having made its first meal on the egg shell does not feed for about twenty-four hours but wanders about, in the field probably migrating far from the hatching site. The larva is very sensitive and at the slightest touch rolls over and over till it reaches the edge of a leaf, dropping from it by a silken thread and swaying about in the breeze. This habit is very marked until about the end of the fourth instar. In the field it is possible that the young larvæ are dispersed by the winds as they hang in this position.

When handled the larva secretes drops of bright green fluid, which appear to be exuded from the mouth but which come from an eversible gland on the ventral surface of the prothorax.

In the early stages the larva is positively phototropic, and in the breeding jars the larvæ collected together in large numbers on the side of the jar nearest the light. This tropism is confirmed by the field observations of Mr. Weddell, who found that bananas were damaged on that side of the bunch which received the most light.

Food Habits.

Young larvæ were placed on inkweed, milk-thistle, and banana leaves. They fed readily on inkweed and thistle, but those which were placed on banana leaves all died before they had completed the first instar. Those which survived more than three days ate so little of the cuticle that it was impossible to see the feeding marks without the aid of a lens. This inability to thrive on banana leaves in the early stages indicates a possible migration in the field from such plants as inkweed to the banana plant. Mr. Weddell found that the heaviest infestations occurred when inkweed was growing in abundance beside a plantation.

The early larval stages are surface feeders and erode the cuticle of the leaf, but about the third instar and onwards they eat the whole tissue of the leaf, commencing at the edge and eating inwards, leaving only the harder tissue of the midrib. On occasions, when no other food was available, they even ate into this.

Ecdysis.

The larva feeds vigorously, increasing in size and casts its skin and head capsule six times, undergoing what is commonly termed a moult or ecdysis. A larva about to moult has a very characteristic appearance. The head capsule appears narrow in comparison with the width of the body. The prothoracic shield which is normally in contact with the vertex of the head, becomes separated from it by an orange coloured membraneous area. The ocelli of the new head capsule can be seen as a group of purple spots showing through the membrane in a lateral position, while the ocelli of the old head capsule are colourless. For a day previous to ecdysis the larva remains perfectly quiescent, and does not feed until the old head capsule is pushed off. In the majority of cases the cast skin is devoured by the newly moulted larva, the discarded head capsule and the pale soft body of the larva indicating that a moult has taken place.

Duration of Larval Instars.

The average duration for each of the six larval instars is given in Table III., where it will be seen that the duration of the second and third instars is shorter than the first; the fourth is also shorter than the first but slightly longer than either the second or the third instars. The duration of the fifth instar is as long as the first, while the period of the sixth instar is the longest of all.

For any one larva the average feeding period is forty-five days. In Table III. it will be seen that the sixth instar is considered as having two well-defined periods—the active or feeding period and the prepupal period—so that the total duration of the sixth instar is obtained by adding the figures in these two columns together.

Effects of Food Plants on Colour Variation of the Larvæ.

Larvæ feeding on the same plant exhibit considerable variation in colouration and markings, while the difference in general colouration is most noticeable amongst larvæ which have been fed on different plants. Larvæ fed on cabbage were very pale translucent green, those on banana fruit yellowish brown with orange substigmatal bands, while those feeding on inkweed were khaki coloured with pale yellow substigmatal bands.

Prepupal Period.

When full grown the larva ceases feeding and the skin darkens, becoming more uniform in colour. The larva now migrates to the soil, burrowing below the surface to a depth of 1½ to 2 inches, and commences the formation of an earthen cocoon. The soil particles are chewed up with the mandibles and are deposited in a moistened condition to form the walls of the cell in which the larva pupates. The larval skin becomes almost black in colour and the body becomes wrinkled and shortened, and approximately eight days after entering the soil the cuticle splits dorsally and the last larval skin and head are cast off and lie inside the cell with the pupa.

The duration of the prepupal period for a series of larvæ will be seen in Table III. and Table IV. This period varies from a minimum of six days to a maximum of ten days.

Pupal Period.

The average pupal period is twenty-nine days. At the end of this time the pupal case splits irregularly and the moth emerges from the soil.

The maximum pupal period is thirty-two days while the minimum is twenty-six days.

Parasitic Enemies.

A number of hymenopterous and dipterous parasites destructive to both larvæ and pupæ were bred from material collected in the field.

Two common parasitic wasps belonging to the Ichneumonidae were bred from pupæ, namely *Lissopimpla semipunctata* Kirby and *Paniscus testaceous* Grav. The adults of these parasites were also observed to be active in the field at Kilcoy and other places where *Tiracola* infestation was severe.

In the laboratory two hymenopterous larvæ were found spinning up in a breeding jar containing larvæ collected at Kilcoy. Each formed a dark-brown cocoon about 4 mm. long, which soon became very hard and wrinkled. Similar cocoons were brought in from Dayboro', where they were reported to be very numerous on the stems of weeds bordering plantations. A cocoon of the same type was also found at Amamoor on banana foliage. Later a small *Tiracola* larva collected at Harlin, which had been confined in a tube by itself, voided a hymenopterous larva which spun up in the tube, forming the characteristic hard wrinkled cocoon. After voiding the parasite the larva ceased feeding, became sickly, and died three days later. Up to the time of the completion of these notes no adults have emerged from these cocoons.*

Hymenopterous larvæ were found attached to the thorax of Tiracola larvæ from Kilcoy. These larvæ were bred through to the adult stage and proved to be *Euplectrus kurandaensis* Girault. The adults were released in a breeding jar containing *Tiracola* larvæ at various stages of development, and the following is a brief account of their life history.

The adult chalcid selected larvæ about the third or fourth instar on which to place the minute oval eggs, which were scattered in groups over the dorsal surface of the host. After an incubation period of four days the eggs hatched and grey coloured larvæ were found attached to the host in the region of the thorax, where they commenced feeding. When the host died the larvæ migrated to the ventral surface of the host and commenced spinning, attaching themselves to the body of the host by silken threads. Just before pupating the larvæ exuded black treacle-like globules of fluid from the anterior end, after which they become white, inactive, and the body contracted. The silken threads soon hardened, and the larvæ became concealed in shiny black cocoons. The duration of the larval period was four days. The adults emerged after a period of seven days, making a total life cycle period of fifteen days. A Tachinid fly was also reared from material collected in the field.

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* The material subsequently dried up without yielding adults.—R.V.

TECHNICAL DESCRIPTIONS.

The Egg.

(Plate 70, fig. 1.)

Average height 0·44 mm., average diameter 0·64 mm. An oblate spheroid, slightly more flattened basally than apically; semitranslucent, pearly white, iridescent, surface reticulated, having the general appearance of a golf ball.

First Larval Instar.

(Plate 70, fig. 2.)

Average length 3 mm., average breadth of head capsule 0·42 mm. Body creamy yellow, head capsule blackish. Prothoracic shield, suranal plate and tubercles mole coloured, the latter being closely approximated giving the larva a ringed appearance most marked on first three abdominal segments. Body clothed with fairly long black setæ arising from tubercles; spiracles oval with mole coloured rims; thoracic legs brown; first and second pairs of prolegs not wholly everted; prolegs bearing from 4 to 9 crochets per leg arranged in a uniordinal mesoseries. An eversible gland is present on the sternal region of the prothorax.

Second Larval Instar.

(Plate 70, fig. 3.)

Average length 7 mm., average breadth of head capsule 0·66 mm. Thorax and abdomen creamy yellow; head dark brown almost blackish; prothoracic shield, suranal plate and tubercles mole coloured, the latter bearing black setae. First three abdominal segments thickly overlaid with burnt orange, giving an irregular banded appearance; fourth segment with narrower orange band, subsequent segments not so marked, more or less blotched with orange, decided blotch on eighth and ninth segments. Thoracic legs dark brown, first and second pairs of prolegs not wholly everted but more so than previous instar; prolegs bearing from 4 to 13 crochets per leg.

Third Larval Instar.

(Plate 70, fig. 4.)

Average length 9 mm., average breadth of head capsule 0·92 mm. Head dark brown, almost blackish; thorax creamy yellow, with mole-coloured tubercles surrounded with white blotches. Setae black, prothoracic shield and suranal plate mole-coloured. Abdominal segments yellowish green with first three segments bearing well-defined brownish bands, the tubercles on these segments being very pronounced, bands on subsequent segments paler but more marked on the eighth and ninth abdominal segments. Dorsally one median and two lateral irregular white lines from the first thoracic to the eighth abdominal segment. Thoracic legs dark brown, first and second pairs of prolegs wholly everted; prolegs bearing from 7 to 20 crochets per leg.

Fourth Larval Instar.

(Plate 70, fig. 5.)

Average length 1·5 cm., average breadth of head capsule 1·6 mm. Head dark brown with yellowish brown vertex. Thorax and abdomen green, with prothoracic shield, suranal plate, and tubercles dark mole-coloured, the latter bearing black setae. Light greyish-green dorsal strip from the first to tenth segments, bordered dorso-laterally by darker olive green area. The light dorsal strip is broken transversely on the first three abdominal segments by prominent mole-coloured tubercles. A yellow substigmatal band on abdominal segments—most prominent on segments 4 to 6 and segments 10 and 11. Spiracles surrounded by darkened area. Eleventh segment produced backwards forming a hood, mole-coloured with posterior margin ochreous. Thoracic legs brown, prolegs greenish, bearing 14 to 22 crochets per leg.

Fifth Larval Instar.

(Plate 70, fig. 6.)

Average length 3·2 cm., average breadth of head capsule 2·5 mm. Head capsule dark brown, vertex yellowish brown, prothoracic shield mole-coloured with black anterior margin. General body colour greenish-brown or khaki; thoracic segments bearing dark median line. A light dorsal area extends from first to tenth segments, eleventh segment smoky with hind margin of hood ochreous, segments eight and nine sometimes bearing a pair of black dorsal markings. Abdominal segments with yellow substigmatal band, most prominent on segments 4 to 6 and 10 and 11. Suranal plate dark brown, tubercles small, white, bearing dark setae. Spiracles with dark brown margins, thoracic legs light brown, pygidium posteriorly margined with yellow. Prolegs bear from 28 to 36 crochets per leg.

Sixth Larval Instar.

(Plate 70, figs. 7 and 8.)

Average length 4·8 cm., average breadth of head capsule 3·95 mm. Head: Face dark brown, vertex yellowish brown, emarginate, antennæ yellow, tips of mandibles reddish brown. General body colour khaki, thoracic shield smoky black with dark anterior margin. Median smoky black line on thoracic and abdominal segments. Dorsal surface slightly lighter than lateral, lighter area intermittently flanked with yellow as far as segment 10. Segments 8 and 9 bear a pair of smoky black markings, which may be transverse, crescent-shaped, or distinctly L-shaped.

PLATE 71.

FIG. 1. Pupa, natural size.
FIG. 2. Pupa, in earthen cell.
FIG. 3. Adult male, natural size.
FIG. 4. Adult female, natural size.
FIG. 5. Damage to immature fruit by young larvæ.
FIG. 6. Damage to mature fruit by later-stage larvæ.

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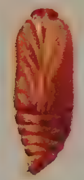
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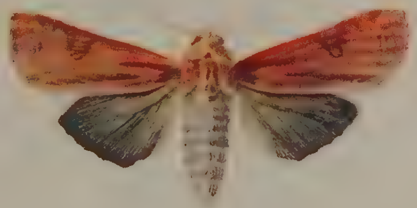
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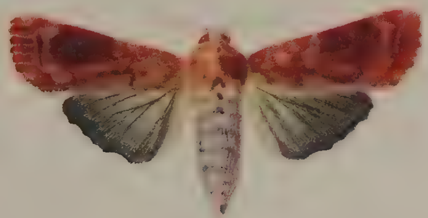
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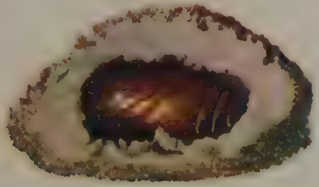
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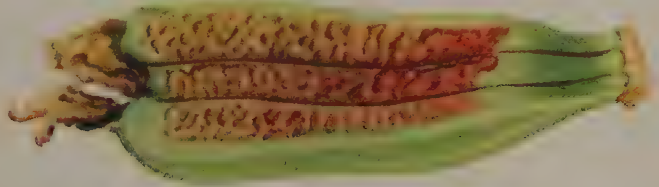
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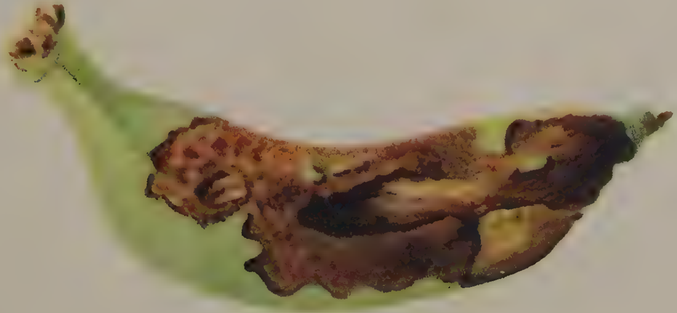
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[illegible] I. W. HELMSING.

Dorsal surface of eleventh segment darker than preceding segment, posterior margin of hood ochreous. Dorsally segment 12 uniformly darker in tone than preceding segments, bearing a smoky spot antero-laterally. Segment 13 dark like preceding segment, suranal plate smoky black with short median dark line, margin of anus bordered with creamy yellow. Thoracic legs yellowish brown darker at junction of segments. Setae dark brown to blackish, tubercles small, white, surrounded by brownish blotches. Prolegs green with black markings on outside. Laterally light yellow oblique lines tilted from before backwards on segments 1 to 8. Substigmatal bands on abdominal segments, not distinct on segments 4 and 5 and 11 to 13. Prolegs bear from 30 to 40 crochets per leg.

An eversible gland is situated on the sternal region of the prothorax. When fully everted this gland reaches to the end of the maxillæ and secretes a bright green fluid which appears to come from the mouth.

The larval instars described above were fed on inkweed leaves.

The Pupa.

(Plate 71, fig. 1.)

Average length 2.5 cm. Mahogany-brown colour, vertex slightly dome shaped, wing pads opaque. First pair of legs reaching to the tip of wing pads, second pair half way, and third pair almost to the tip of pads. Spiracles dark brown transverse slits. Abdominal segments 3 to 8 on the dorsal surface, and abdominal segments 5 to 7 on the ventral surface, have their anterior margins finely punctate. The posterior segment bears a cremaster of six hooks. The abdominal segments are sparsely clothed with light brown microscopic setae.

The Adult.

(Plate 71, figs. 3 and 4.)

The moth agrees with the following description taken from the Fauna of British India, "Lepidoptera," volume II., page 282, where it is described under the synonym *Arcilasisa.*

"Pale grey brown; abdomen fuscous. Forewing often much diffused with red-brown and irrorated with dark brown; an indistinct waved antemedial line, often almost obsolete; the orbicular obsolete; the reniform almost obsolete ochreous or fuscous, sometimes on a dark patch; traces of a postmedial curved series of black specks; a submarginal doubly curved ochreous line; a marginal series of black specks; hind wing fuscous; the cilia whitish."

TABLE I.—OVIPOSITION RECORDS FOR FERTILISED MOTH.

Number of Egg Batch.	Date of Oviposition.	Number of Eggs per Batch.	Total Number of Eggs.	Date of Emergence.	Incubation Period in Days.	Average Incubation Period in Days.
	1927.			1927.		
1	22 June	713	2,398	30 June	8	8·4
2	23 June	241		1 July	8	
3	24 June	760		2 July	8	
4	26 June	423		5 July	9	
5	27 June	261		6 July	9	

TABLE II.—Oviposition Records for Unfertilised Moths.

Number of Series.	Date of Emergence of Moth.	Period in days between Emergence and Ovi-position.	Oviposition.			Date of Death of Moth.	Longevity of Moth in Days.
			Date.	Number of Eggs.	Total Number of Eggs.		
	1927.		1927.			1927.	
B 1	5 May	5	10 May	11	495	12 May	7
			11 May	235			
			12 May	249			
B 3	16 May	5	21 May	34	539	*	..
			22 May	12			
			23 May	456			
			24 May	37			
L 4	27 Sept.	7	4 Oct.	130	437	11 Oct.	14
			8 Oct.	124			
			9 Oct.	183			
L 38	26 Sept.	6	2 Oct.	47	692	11 Oct.	15
			4 Oct.	125			
			5 Oct.	216			
			7 Oct.	304			
L 52	29 Sept.	10	9 Oct.	17	823	16 Oct.	17
			11 Oct.	13			
			12 Oct.	72			
			13 Oct.	110			
			14 Oct.	62			
			15 Oct.	343			
			16 Oct.	106			
I 9	23 Sept.	8	1 Oct.	37	37	2 Oct.	9
I 13	24 Sept.	8	2 Oct.	50	809	9 Oct.	15
			3 Oct.	138			
			5 Oct.	158			
			6 Oct.	448			
			7 Oct.	15			
I 14	25 Sept.	5	30 Sept.	230	688	5 Oct.	10
			1 Oct.	22			
			2 Oct.	53			
			3 Oct.	250			
			4 Oct.	133			
I 16	25 Sept.	7	2 Oct.	130	1,365	10 Oct.	15
			3 Oct.	17			
			5 Oct.,	833			
			6 Oct.	186			
			8 Oct.	189			
			9 Oct.	10			
I 17	23 Sept.	6	29 Sept.	307	1,500	8 Oct.	15
			30 Sept.	186			
			1 Oct.	192			
			2 Oct.	655			
			5 Oct.	37			
			6 Oct.	105			
			7 Oct.	10			
			8 Oct.	8			
I 18	25 Sept.	4	29 Sept.	3	714	8 Oct.	13
			30 Sept.	37			
			1 Oct.	65			
			2 Oct.	90			
			3 Oct.	165			
			4 Oct.	170			
			5 Oct.	140			
			6 Oct.	1			
			7 Oct.	43			
I 19	26 Sept.	7	3 Oct.	69	701	10 Oct.	14
			7 Oct.	428			
			9 Oct.	204			
I 23	28 Sept.	8	6 Oct.	13	171	11 Oct.	13
			8 Oct.	44			
			9 Oct.	114			
	Average	6·61	..	..		Average	13·08

* Moth escaped.

TABLE III.—LIFE CYCLE STAGES (COMPLETE RECORDS).

Series Number.	Incubation Period in Days.	Duration of Larval Instars in Days.							Pupal Period in Days.	Total Life-Cycle Period in Days.
		I.	II.	III.	IV.	V.	VI.			
							Feeding Period.	Prepupal Period.		
L 1	8	8	4	5	7	8	14	8	30	92
L 6	8	8	5	5	5	9	12	7	32	91
L 13.. ..	8	7	5	6	5	9	12	9	31	92
L 21.. ..	8	8	5	5	5	9	11	10	30	91
L 22.. ..	8	8	5	5	6	9	11	10	29	91
L 26.. ..	9	7	5	4	5	8	13	6	27	84
L 30.. ..	8	7	5	5	6	8	13	9	31	92
L 38.. ..	8	8	7	6	8	6	14	9	28	94
L 42.. ..	8	8	6	7	6	9	13	9	29	95
L 50.. ..	9	14	7	6	7	6	12	6	30	97
Averages ..	8·2	8·3	5·4	5·4	6·0	8·1	12·5	8·3	29·7	91·9

The period during which the above results were obtained extended from June to September.

TABLE IV.—LIFE CYCLE STAGES (INCOMPLETE RECORDS).

Series Number.	Duration of Larval Instars in Days.							Pupa Period
	I.	II.	III.	IV.	V.	VI.		
						Feeding Period.	Prepupal Period.	
L 2 ..	8	4	5	6	8	13	..	..
L 4 ..	..	..	..	..	..	..	8	28
L 5 ..	7	5	5	6	9	14	..	..
L 14 ..	8	8	5	6	7	13	..	..
L 16 ..	8	4	5	6	9	11	..	..
L 17 ..	8	6	5	5	9	13	..	..
L 20 ..	7	5	6	5	9	14	7	..
L 25 ..	8	4	5	5	8	12	..	..
L 27 ..	7	5	5	6	7	12	6	..
L 29 ..	7	5	5	6	9	12	9	..
L 31 ..	7	7	4	7	8	14	..	..
L 35 ..	..	..	6	7	8	12	8	29
L 36 ..	8	7	7	7	8	14	..	..
L 37 ..	8	7	6	7	9	11	..	..
L 39 ..	8	7	6	6	7	13	8	..
L 40 ..	8	7	7	8	7	12	9	..
L 41 ..	8	6	4	7	8	13	8	..
L 43 ..	8	6	5	7	6	13	..	..
L 44 ..	8	8	5	7	8	12	..	..
L 47 ..	8	12	6	6	9	12	..	..
L 52 ..	..	..	..	..	..	..	9	31
L 55 ..	..	..	..	..	..	..	7	31
L 60 ..	..	..	..	..	..	..	9	30
L 61 ..	..	..	..	..	..	..	8	29
L 62 ..	..	..	..	..	..	..	7	26
L 64 ..	..	..	..	..	..	..	8	26
Averages	7·72	6·27	5·36	6·31	8·05	12·63	7·92	28·75

The period during which the above results were obtained extended from June to September.

CLIMATOLOGICAL TABLE—FEBRUARY, 1930.

SUPPLIED BY THE COMMONWEALTH OF AUSTRALIA METEOROLOGICAL BUREAU, BRISBANE.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·88	87	75	89	6	72	15	1,905	16
Herberton	..	81	63	89	28	55	14	959	15
Rockhampton	29·96	86	70	95	15,16	65	11	439	12
Brisbane	30·06	83	68	92	15	63	13,28	181	13
Darling Downs.									
Dalby	30·02	86	62	99	16	54	12	123	8
Stanthorpe	..	80	58	94	22	52	13	136	10
Toowoomba	..	77	59	90	15	56	4,12,13, 27	427	10
Mid-interior.									
Georgetown	29·85	90	72	95	14,16	67	12	706	10
Longreach	29·88	94	71	107	16	64	11	140	6
Mitchell	29·97	91	67	105	16	59	11,12	89	5
Western.									
Burketown	29·84	89	75	95	4	69	6	1,583	13
Boulia	29·83	98	73	108	16,17	66	11	367	5
Thargomindah	29·90	95	76	107	15	64	24	206	3

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING FEBRUARY 1930 AND 1929, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Feb.	No. of Years' Records.	Feb., 1930.	Feb., 1929.
North Coast.	In.		In.	In.
Atherton	10·14	29	17·25	21·07
Cairns	15·53	48	13·74	28·02
Cardwell	17·10	58	17·67	15·24
Cooktown	13·49	54	19·05	26·68
Herberton	7·67	43	9·59	14·63
Ingham	16·52	38	18·04	18·48
Innisfail	22·61	49	14·98	39·52
Mossman	17·41	17	34·27	31·60
Townsville	11·46	59	7·69	5·25
Central Coast.				
Ayr	9·22	43	4·12	4·15
Bowen	8·87	59	6·89	4.74
Charters Towers ..	4·51	48	3·41	4·86
Mackay	11·57	59	5·62	12·41
Proserpine	12·37	27	13·00	19·58
St. Lawrence.. ..	8·05	59	4·96	11·08
South Coast.				
Biggenden	4·36	31	3·54	7·72
Bundaberg	6·22	47	5·00	10·73
Brisbane	6·25	79	1·81	6·24
Caboolture	7·46	43	3·85	6·72
Childers	6·62	35	4·02	12·51
Crohamhurst ..	13.03	37	9·28	6·45
Esk	5·42	43	6·57	7·91
Gayndah	4·32	59	3·51	8·39
Gympie	6·66	60	5·64	10·78
Kilkivan	5·01	51	4·27	5·37
Maryborough ..	6·44	58	5·00	3·21
South Coast—continued:	In.		In.	In.
Nambour	9·59	34	5·76	12·07
Nanango	4·19	48	2.35	4·13
Rockhampton ..	7·99	43	4·39	36·37
Woodford	8·47	43	5·11	6·14
Darling Downs.				
Dalby	2.87	60	1·23	2·80
Emu Vale	2·64	34	1·22	7.75
Jimbour	2·65	42	2·00	1·91
Miles	2·80	45	1·49	3·59
Stanthorpe	3·31	57	1.36	5·85
Toowoomba ..	4·51	58	4·26	10·37
Warwick	3·15	65	2·05	6·72
Maranoa.				
Roma	3·08	56	0·30	4·68
State Farms, &c.				
Bungeworgorai ..	2·53	16	0.20	3·94
Gatton College ..	3·43	31	..	5·98
Gindie	3·01	31	0·85	5·98
Hermitage	2·64	24	..	5·47
Kairi	10·02	16	8.18	15·37
Mackay Sugar Experiment Station ..	10·66	33	4·38	12·77
Warren	5·14	15	1·64	24·44

GEORGE G. BOND, Divisional Meteorologist

GROWING FODDER FOR WINTER USE IN CENTRAL QUEENSLAND.

By G. B. BROOKS, Senior Instructor in Agriculture.

With our somewhat erratic rainfall in the months from June to October, the growing of fodder crops during that period is attended with some risk, consequently it is pleasing to find that farmers in increasing number are taking the precaution of raising high-yielding succulent crops in late summer for winter use. The subjoined notes by Mr. Brooks are seasonably appropriate.

THIS method of providing an assured supply of green material has been demonstrated by the Agricultural Branch of the Department for many years. The crops recommended are sudan grass and sorghum. High-yielding varieties of the latter are being bred by the Department, and demonstration areas planted out in the various dairying districts. Sudan grass should either be fed at the beginning of winter, or cut and stacked as hay. The sorghum can be allowed to stand over and be harvested as required. In localities where very low temperatures may at times be experienced, the risk of getting severely frosted (light frosts are not damaging) is obviated by storing in a trench or stack silo. Both crops are somewhat low in protein, and when used for milk production a little lucerne or cowpea hay, cotton seed, bran, &c., will be found of much benefit.

Not a Matter of Luck.

Notwithstanding the fact that our winter rains are somewhat scant and irregular, farmers are to be found in practically every district who seldom fail to raise satisfactory crops of either barley, wheat, or oats. This is not a matter of luck, as some who have failures would suggest, but is the result of conserving the moisture in the soil by early and thorough preparation. Land for winter crops should be broken up months ahead. Ploughing one week and planting the next is only courting disaster.

Providing Feed for an Extended Period.

It is most desirable that in grazing winter crops provision should be made for the supply to last over as lengthy a period as possible. To obtain this objective, a succession of sowings made, say, every three weeks would appear desirable. Unfortunately, this practice is not to be recommended, the reason being that the winter rainfall is really too irregular to permit of its being carried out with any degree of safety. Scattered rains can usually be depended upon until June, but subsequent months are invariably dry.

Varieties to Sow.

An alternative to successive sowings is the utilisation of a number of cereal varieties that will come into the useful stage at different periods from the one planting. The selection of varieties, of course, applies more to crops that are to be cut and fed rather than to those that are to be grazed off. The matter of keeping the stock off any particular portion can, however, be overcome by the erection of a skeleton fence.

In the demonstration trials carried out by the Department for a number of years in the various dairying districts, it has been found that the following varieties have given very satisfactory results. In regard to maturity, those selected are Early, Medium, and Late, and will become available in the order named:—

Skinless barley—Rate of sowing, 1 bushel per acre.
Cape barley—Rate of sowing, 1 bushel per acre.
Florence wheat—Rate of sowing, 1 bushel per acre.
Algerian, Sunrise, or Ruakura oats—Rate of sowing, 1½ bushel per acre.

In addition to Florence, a later-maturing wheat could, if desired, take the place of the oats, such as Huguenot, Warden's Hay, or Cleveland. Wheat is much more dependable than oats in a dry season, while in a wet winter oats are subject to rust. For several years rye and Canary grass were included in these trials, but owing to the indifferent results obtained were discontinued.

Field Peas a Useful Addition.

In the event of any of the crops mentioned being raised for hand-feeding purposes, both nutritive value and yield per acre can be considerably increased by mixing with them a ½ bushel of field peas per acre. To ensure the covering of the peas, they should either be sown on a cultivated surface and lightly ploughed, or disced in. In loose or friable soil, it is a distinct advantage where the crops are to be grazed, and when a drill is not available, to disc or shallow-plough both cereals and field peas.

Time to Plant.

In order to provide feed during early winter, planting should be carried out at the earliest possible date. A good deal of risk is, however, attached to very early sowing, consequently it is advisable to allow summer conditions to pass, and the soil to cool somewhat before sowing. Should high temperatures, combined with humid conditions, follow germination, a spindly growth, failure to stool, and premature seeding will invariably result.

No actual date can, therefore, be stated, the time being dependent on climatic conditions. May, however, is generally considered a safe month to plant. In the more Western districts sowing can usually be undertaken at a somewhat earlier date than on the coast.

Crops Suitable for Pig Raising Purposes.

The Department has, by practical demonstrations, endeavoured to impress upon pig raisers the benefit accruing from the growing of root and other crops during the winter.

Although the winter rainfall is somewhat precarious, yet when due consideration has been given to the preparation of the land, a large measure of success has attended these trials.

The method adopted for the selection of crops for the dairy herd will also apply in the case of pigs—that is, to plant a range of varieties that will, from the one planting, mature over a very wide period. Planting can usually be carried out during the latter part of March or early in April. However, should the weather be hot and humid, sowing could be delayed for a week or two. Rape and Yellow Turnip are liable to aphis attack in hot weather.

The varieties mentioned will mature in the order mentioned, and should, if conditions are at all favourable, provide a feed from, say, June to December. Sow in rows 2 feet 6 inches to 3 feet apart:—

Rape—2 to 3 lb. per acre. No thinning required.

Yellow Aberdeen Turnip—2 lb. per acre. Thin to about 8 inches apart.

Field Swede Turnip—2 lb. per acre. Thin to about 8 inches apart.

Cattle Cabbage—Raise in a bed and transplant.

Sugar Beet—4 to 5 lb. per acre. Thin to about 8 inches apart.

Long Red Mangel—5 lb. per acre. Thin to about 12 inches apart.

Yellow Globe Mangel—5 lb. per acre. Thin to about 12 inches apart.

Rape and turnips should be sown at a shallow depth. The latter will give best results if planted on a slight hill. Mangels occasionally give an indifferent germination through not obtaining sufficient moisture. Either rolling or pressing the soil around the seed after sowing is an advantage. Should the soil be dry, soaking the seed prior to sowing will hasten germination. Mangels and Sugar Beet can be transplanted when about the thickness of a lead pencil, choosing dull, moist weather for this operation. Owing to the heavy yields usually obtained, Mangels will repay transplanting, utilising the thinnings. When the Scottish Delegation visited Gatton College, they unfortunately could not visit the farm on account of the heavy rains. The writer procured a dray load of Mangels for their inspection, every root weighing over 56 lb.

Field Carrots, Thousand Headed Kale, and Silver Beet are useful additions to the crops mentioned. The latter, being aphis-resistant, will provide green material during early summer, when it is not possible to grow Rape; 5 lb. of seed are required per acre. This plant is often used for culinary purposes when other vegetables are scarce.

RURAL LIFE IN OTHER LANDS.—XI.

By the EDITOR.*

BYWAYS IN BELGIUM.

IN our last talk we were discussing some minor aspects of social life in Belgium. We showed, or rather suggested, that no people have become so subjective to social and economic experiments as the Belgians, and that, whereas in other countries man has been more or less influenced—even to the extent of transportation—by his environment, in Belgium man has transformed and conquered Nature.

A Land with a Long History.

It is a mistake to regard Belgium as a modern political creation dating only from the thirties of last century. As a matter of fact, it is one of the oldest of European nationalities. Bruges, for instance, with its charming vignettes and vistas, its network of waterways that down through the ages have continued to carry the commerce of a continent, and its quaint architecture—particularly of its churches and municipal buildings—Bruges, that delights every visitor from newer and younger lands, was the Venice of Northern Europe when London was still a village. For many centuries, we are told, the Belgian people produced a common and original culture, and knocking around that country one saw many evidences of this. That culture has been municipal, not feudal; democratic, not aristocratic. In the past Belgium was mainly a federation of self-governing cities, and its municipal monuments, its town halls, its guild halls, its belfries, its church buildings, and other architectural adornments are typical of its cultural development and symbolical of its national life.

It is an interesting theme, the development of a social life of a people and its culture, but time will not allow me to follow too long that very fascinating by-path.

Physical Features.

Belgium has only forty miles of coastline, and, like Holland, much of its land surface is below sea-level. The work of reclamation in one form or another is still going on. So low-lying is much of the country that water was employed to good effect as one of the main lines of defence during the great war. The opening of dykes and the flooding of part of the country in 1914 checked, it will be remembered, especially by those Australians who fought in Flanders, substantially the invaders' advance.

The climate is something like that of the south of England, though, in my experience, much more sunless. Days of unbroken sunshine average only about twelve a year—not much good to a Southport surfer!—and generally it is cloudy and rainy. It is colder than England in winter, when if one does see the sun it appears as a pale, cheese-coloured disc, with just enough power to illuminate its own impotence.

Belgium has great mineral wealth—iron, zinc, and coal. Additional mining fields have been discovered in recent years, and as a result the bleak moorlands of the Campine, on the Dutch border, have become a thriving industrial area.

The country is equally rich in agricultural resources and every variety of produce is grown, yet all the same, like Holland, the agricultural wealth of Belgium has been created mainly by unremitting human toil.

Much of the plain of Flanders was once a desolate waste, a seemingly boundless expanse of unproductive land. Other sections around Antwerp and elsewhere formed part of a large marsh—boggy, water-logged country.

In passing, may I say that, however one may admire the industry of the European peasant as manifested in an extraordinary variety of ways, one still thinks that in a new country like Queensland what is required—and I think it is what we already have—is not a peasantry more or less overburdened, but an intelligent and technically trained yeomanry to whom primary production offers reasonable security and some financial prospects.

A Country of Workers.

Belgium is a country of farmers and artisans. Half the population live by agriculture—grain-growing, dairying, cattle-breeding, horticulture, and so forth. And the other half live by secondary industry, which is highly organised. Technical education both in the arts of field and factory is highly developed, and in the

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* In a radio address from 4QG.

Workers' University at Charleroi I saw one of the most complete plants for technical instruction in full operation, with students enrolled to the full strength of the establishment.

Living Standards.

There, as in Holland, are no large landowners, and 500 acres of country is considered as an exceptionally big estate. The density of the population has created keen competition in every calling, and viewed from our standpoint wages and salaries are in consequence very low. Living standards are, however, being raised steadily through organised industry, and a powerful, ever-extending co-operative movement.

Transport.

Transport facilities are wonderfully well organised in Belgium. Brussels, the capital, is only thirty minutes journey from Louvain and Malines; it is only an hour from Antwerp and Ghent; about two and a-half hours from Ostend on the coast, and from Liege in the other direction near the German border. It is less than five hours from Paris. The road system is excellent, and everyone seems to own a bicycle. There is a close network of railways; and as feeders to the main arterial lines there are many light lines which help to keep the population well distributed. These light railways have assisted very materially in checking the exodus from the country to the cities, and have been a beneficial factor in the continuance of village life by the factory worker. One day I travelled seventy miles by an electric tramway connecting various towns and villages—starting at a place called Lobbes and passing through Binche where the British cavalry made a first contact with the invading forces in 1914, and going on to Mons, thence to La Louviere, and returning by another route to Charleroi, the whole distance being travelled in ordinary electric trams which ply between town and town and village and village.

A Centre of Commerce.

Being at the cross-roads on well-beaten international routes, Belgium is naturally a great commercial country, enjoying, in addition to its external trading enterprises, a prosperous home market. The Belgian village market to which produce is brought from the surrounding farms and sold in the open squares, and which Australian Diggers found so quaint, is one of the picturesque survivals of the middle ages and presents one of the interesting social aspects of Belgian life.

Fortunes Down a Drain Pipe.

Anyone who has had an opportunity of studying agricultural development in the old country—I mean Great Britain—will remember the fortunes that have gone, so to speak, down a drain pipe. Fortunes have been buried in deep drains and other works which our conservative forefathers considered essential to the task of reclaiming the soil. The consequence is that most people there look sideways at any reclamation project. But science has not stood still since their day, and the progressive farmer knows very well that the costly processes of old have been replaced with others much cheaper as well as more effective. Let us go to Esbeek, in Belgium, to see what can be done in the way of land reclamation with modern appliances and, incidentally, get some idea of what land settlement means in the older countries, where every arable acre and every perch of grassland is brought under tribute to man's energy and to meet man's necessity.

From Antwerp to Turnhout.

Let us start, say, from Antwerp on the light railway to a place called Turnhout. On either side of the line we see a variety of growing crops, and at the same time catch glimpses of inland sand dunes and waving heather. Leaving the railway we take a car as far as it will go, and then get out and travel on foot. Having got to that stage we have a fair idea of the country. The Campine, the country we are looking at, stretches from Antwerp into Holland, and contains the poorest land in Belgium. Standing in the middle of it we see all round a great, flat, hungry-looking plain covered with heather and presenting a picture of hopeless barrenness.

Out of the Wilderness—A Lesson in Reclaiming Waste Lands.

Out of a wilderness such as this was created the rich and beautifully wooded estate of Esbeek. The feat was not accomplished by some multi-millionaire with money to burn, nor by a paternal Government. It was done by a Dutch insurance company. That an insurance company chose such an investment for its funds was at first glance surprising, but a close observation showed its sense of values and of a satisfactory security.

Both Belgians and Dutch are tackling the job of reclaiming waste land, employing modern engineering plant—tractors and so forth—as a purely routine business matter. Very little has been written and less said about it. Instead of talking they act, and let their work supply the convincing rhetoric and its own propaganda.

The first furrow in the reclamation scheme was opened in 1901, and the whole project completed long since, and the country which was once a barren waste brought into full and payable production. Esbeek is now what is called a model agricultural and forest farm. At the time of our visit what had been formerly a sour, sandy waste was waving with wheat and rye. A herd of pedigree cattle was grazing on rich pastures as contentedly as Shorthorns on an English park or Illawarras on Queensland dairy lands. The homestead and farm buildings were on a substantial scale, and surrounded by plantations of pine trees that had been planted eighteen years before. They looked at least a century old. Orchard lands were a beautiful feature of the farm layout, and the fruit trees laden with a bountiful harvest reminded one vividly of the apple lands on the road to Rouen, down in Normandy.

The whole of this estate was wrested from utter waste in the short term of eighteen years, and the success of this and other reclamation projects has aroused interest in English counties where similar conditions exist.

A Queensland Example.

In Queensland in other forms of reclamation—the reclamation of an extraordinarily rich volcanic land from the jungle and the winning of our rich blacksoil river flats—we can present many examples of success in developing unproductive lands along every stage from the primitive to the practical, from rich promise to ripe fulfilment. But we have not as yet had to confront the problem that farmers have to face in overpeopled Europe where every acre must have its productive value, and where every plant constituent taken from the soil must be returned in full and ample measure.

It would be idle, of course, to institute comparisions, and it has not been intended, for the conditions of agriculture in the old world are in many important points so entirely dissimilar from those of Australia; and let me say this: that we in Queensland have reason to regard with some satisfaction the position we have reached in the world's industrial economy. In field practice and scientific direction we have some achievements to our credit. Queensland wheat to-day, the varieties evolved by our plant breeders—Soutter, Quodling, and others—at the Roma Experiment Station, for instance, has created a world's record for weight of grain per bushel. The work of our sugar experiment stations and that of our sugar scientists is evident in record sugar tonnages. We are dairying successfully and extensively on tropical lands, and so far as I know no other country is doing that. On every agricultural and pastoral problem we are bringing trained brains to bear on its solution. We are bringing science and technical efficiency into the paddock wherever they can be applied. We are organising agriculture under farmers' control, in every present practicable direction. And all this is to the good, but, of course, we can always learn something more about our own job; and where they apply or relate to our own particular interest, lessons from the older lands—from Britain, Denmark, Holland, Belgium, and elsewhere—will not be ignored by us.

FUR-BEARING RABBITS.

In view of the many inquiries made by persons who have been attracted by suggested possibilities in the farming of fur-bearing rabbits, the Minister of Agriculture and Stock (Mr. Harry F. Walker) announced recently that, in the absence of official information as to marketing facilities overseas, and in order to give intending investors in the industry an opportunity to ascertain the state of the market, he had arranged for a cable to the Agent-General in London, with a request to supply this information. In reply, the Agent-General has informed him to the effect that supplies of Angora rabbit wool far exceed the demand, and the average price of first-grade wool is about £1 3s. per lb. The market for Chinchilla rabbit pelts is also much depressed, as present prices for best winter only reach 5s., but average about 2s., with heavy stocks on hand.

As a result of this information the Minister suggests that caution should be exercised in the establishment of this industry, and that market possibilities should be closely studied if, as is probable, heavy supplies of rabbit fur are made available in Australia.

DENMARK'S DAIRYING INDUSTRY.

The following information on features of the Danish dairying industry has been supplied by Mr. F. Wigan, Commonwealth Dairy Officer, London, who recently visited Denmark:—

Herd Testing.

The testing of cows for production is a strong feature in Denmark, and there are no less than 1,250 Head Testing Associations, with 40,000 members, and helped by this the production of the cows has been actually doubled. The average cost per year of testing amounts to about 2s. 8d. per cow to the farmers, who transport the tester from farm to farm, and provide him with board and lodging. There are also over 1,000 Bull Clubs or associations, which, like the Herd Testing Associations, are practically all co-operative.

Careful breeding, culling, and selection, together with systematic testing of the cows, has enabled the Danes to secure a high average butter production per head, but one can see that they have realised that sufficient and scientific feeding is the basic essential for success; for, notwithstanding the production of large quantities of food on the farms, they have not hesitated to spend money on imported fertilisers to increase fodder yield, but they also import annually the large quantities of feeding stuffs I have previously referred to. Dairying depends primarily on economic and plentiful food supply, and the Danes, realising it, have shown the way to the world in developing it. This and their wonderful co-operative systems is, I think, the chief lesson for an Australian dairy farmer who visits Denmark.

Factories.

There are about 1,600 factories, or, as they term them, creameries in Denmark, 94 per cent. of which are co-operative, each receiving milk daily from 600 to 2,000 cows, averaging about 1,000 cows to the factory. I was able to visit the older type of factory and the most modern factories in both Jutland and Zealand districts. The factories are mostly of uniform plan, the milk being received on a small platform, and then passed on into a large central room of the factory where almost everything in its manufacture into butter takes place. After weighing, the milk is passed into a flash pasteuriser in which it is heated to about 130 deg. Fahr., from whence it is run into separators (usually two or three of these) and skimmed. From the separator the cream is pumped into a second flash pasteuriser where it is heated to about 195 deg. Fahr. It then passes over ordinary pipe coolers, leaving them at about 45 deg. Fahr., to enter the cream-holding vat, which in some instances is of the aluminium jacketed type without atemporators, and is situated in another room called the cream room. These cream tanks are usually fitted with an hydraulic lifting apparatus, so that by a few turns of the handle the whole cream vat is raised to a sufficient height to enable the cream to run into the churns. The cream tank is also on a small turntable, thereby enabling it to be turned in any direction necessary when emptying it. The skim milk is also pasteurised by law to a minimum of 180 deg. Fahr. before it runs into a skim milk tank, from which the farmers are returned their portion of skim milk to the farms.

In the smaller factories the churns of the long barrel type or simplex type are situated in the general manufacturing room with the separators, pasteurisers, and coolers, but I noticed the more modern ones have a separate room for the churning and the packing of the butter. The churning methods appear to be approximating ours more closely, showing a finer grain and less free moisture than it used to, and as far as I could learn the average moisture content was not much above 14½ per cent.

The factories I inspected were very clean, and had tiled walls and floors, whilst the utensils had every evidence of being well scrubbed and kept in good condition. The churns especially were given full attention with the scrubbing-brush and small quantities of washing soda and chalk used in the washing water.

Most of the factories use the gerber test for butter fat, and 85 per cent. of them the methlene blue test to detect the poor quality milk. The milk is paid for according to butterfat test, plus the results of the methylene blue test for quality, and in this way the factory manager has a full knowledge of his good suppliers, and the careless farmer is penalised for his unsatisfactory work.

All cream in Denmark for butter-making is ripened with a starter added to it in the cream vat after pasteurising and cooling. The percentage of starter used varies a little, ranging from about 2½ per cent. to 4 per cent. The cream with this added starter is well stirred and remains in the vat overnight at a temperature of about 65 deg. Fahr. until churning time in the morning. From the few starters I saw in Denmark, and from my examinations of Danish butter generally, I have concluded that their starters must be irregular, or develop irregularly, resulting in variation in flavours and keeping quality in their butter, and from this experience I am more than ever convinced that it would be dangerous for Australia to export butter from Australia made from cream to which a starter has been added after the pasteurising of the cream.

Starters.

My interviews with Professors Orla Jensen and Knudsen at their respective laboratories enabled me to get the latest information in connection with the preparation of a suitable starter for butter-making, as Professor Orla Jensen commenced investigations concerning the bacteriology of starters some years ago, and his work has been carried on where he left it by Professor Knudsen up to the present time, whilst Professor Orla Jensen's investigations on clean milk recently have added bearing on the matter. These Professors have arrived at the opinion that certain foreign substances in milk have decided influence on the behaviour of the germ life present. For instance, when autolysed yeast phosphates and citrate of sodium have been added to pure milk, creating what is termed buffer action, a greater germ activity is noticed. They find that the chief organisms of a suitable starter consist of streptococcus cremoris and the oroma-producing bacteria which have been named bactacoccus cremoris, which have the capacity for growing well in symbiosis. Split products produced in the milk by the streptococci organisms produce conditions suitable for rapid growth of the betacocci and the formation of acidity by them.

Investigators have not yet discovered any certain two or three organisms which are alone responsible for the desirable flavour of butter if propagated in an absolutely pure milk, and it may be that certain protein-attacking organisms assist and are essential for the best results.

The starters used at the butter factories are mostly those of the powder or tablet form placed on the market under Hansen Standard Starter or the Flora Danica Brand. From these commercial starters the factory manager prepares his liquid starter by adding some of the commercial starter to a small quantity of previously sterilised skim milk—i.e., milk which has been standing in boiling water for about one hour. This process is carried on until sufficient starter is developed of suitable activity for use in the cream, 1 to ¼ per cent. of starter being used for the mother starter from day to day, whilst the cream receives somewhere about 4 per cent. starter.

I do not propose to enlarge on starters in this report, but I feel sure that with the more frequent daily deliveries of cream to the factories in Australia, the necessity of thoroughly understanding and using starters will become imperative if we wish to excel in quality with our butter.

Grading Station.

I was very anxious to visit the grading station in Copenhagen and see how the work is carried out there, consequently I arrived in Copenhagen to be there on a Monday, which is the day of each week when grading is carried out. On a given day once a week certain factories receive a telegram instructing them to send one cask of that day's manufacture immediately to the Copenhagen grading station, where it is placed in store and held at a temperature of about 60 deg. Fahr. for a fortnight. At the end of that time the casks that are a fortnight old are placed in three separate rooms for the judges to examine. The day I was there there were about 170 casks ready for judging, placed in three separate rooms, with about 50 odd casks in each room. There are nine judges to do the work, consisting of six exporters, two factory managers, and one Government expert. They are split into three groups of three, each group having two exporters, with the Government expert in one group and a factory manager in each of the other two. All the judges examine all the butters—group No. 1, say, judging in room A, whilst group No. 2 judges in room B, and group No. 3 in room C. When they have finished in these rooms they just pass on, group No. 1 going to room B, and so on, until they have all judged every cask of butter. The number of points used in judging are 15 only, and no butter ever gets 15 points. All butters scoring 10 points and upwards entitle their factories to continue using the Lur Brand for export, and the 10 points are arrived at by the average points of the nine judges for that cask. Where any great variation in points takes place, such as I saw in one instance from 8 to 13, the whole of the nine judges go and examine this butter together and arrive at a final decision for it. Very few remarks are made on the judging slips, and these only when the butter is inferior in quality. The points awarded to butter that day for the worst butter averaged 5.8 and for the best 11.7. I was able to examine these butters, and a number of others, and compare their opinions with ours. Their highest scored butters had mild acidity and they appear to be realising the bad effect of extra high acidity on the quality of butter, for I noticed their remarks in defects against butter included the word "acidity." Although some of the terms on the grading slip were the same as we use, such as "oily," "cheesy," "unclean," "free moisture," and "acidity," I was struck with the number of butters showing low points where no explanation of the defects was set against them. Some of the best butters I saw were unsalted, and amongst the defects were overlooked flavour, unclean, cheesy, metallic, free moisture, greasiness, and streaky colour, but for the most part the butters were of good quality, and a very high percentage of them passed for the Lur Brand.

Amongst conditions for the use of the Lur Brand is that the nett weight and date of production must be marked on the Lur branded staves of the casks or on the ends of boxes, and the date of manufacture must also be stamped on the control labels placed on the butter. Many factories pay a bonus for quality, and take the Lur Brand grading 10 points as a basis—i.e., if a factory has an average grade of 11.7 that factory receives 1.7 more than the one grading 10 or standard only.

The weights of all casks of butter are checked and the butter analysed for moisture.

All factory markings on the casks and the butter are covered up so that none of the judges are aware of the identity of the butter, and they know the butters only by the numbers on the drums which are slipped over the casks. In discussing their method of grading with me, Mr. Sorensen said he was greatly impressed with the system of grading the butter at the port of export by officials, such as is done in Australia, and only because it is quite impracticable in Denmark has he not attempted to introduce it there, the reason being that the butter is exported from many centres, in strong contrast to the one or two ports of export in each State in Australia.

In this butter judging a fine system of recognising factories consistently producing high-quality butter has been instituted—i.e., a diploma is awarded to all factories who have maintained not less than Lur Brand quality without one failure during three consecutive years of grading, whilst if this record is continued for seven years a diploma of honour is issued, and a greatly coveted honour of a gold medal is given to the factory that keeps up this standard for a period of ten years without default. It was very interesting to see a list of the factories who had obtained these honours and, in the case of the gold medallists, the photograph of the manager of the factory obtaining same was hung in the meeting room of the judges at the grading station, totalling in all twenty-one gold medallists in a forty years period.

If the quality of the butter from any one factory is inferior, and continues so for two or three occasions, the manager is advised to call in the Government Dairy Expert for the district, and some little time is allowed for him to remedy the faults in the butter. If it still continues to be unsatisfactory the police are notified, and they remove all Lur Brand staves and control slips from the factory, and that factory cannot export butter until the quality of the butter is improved and they are again accepted for the Lur Brand.

Five Government dairy instructors, who are situated in various districts, as they are in Australia, are employed in supervising and helping factory managers where the quality of the butter is found to be unsatisfactory.

Government Experimental Dairy Farm.

I visited this dairy, which is situated at Hillerod, some little distance north of Copenhagen, and was pleased to meet there the manager, Mr. A. Hansen, whom I had met during the World's Dairy Congress in London, during a visit to Tooley street, where I discussed our and other countries' butters with a number of the Danish delegates to the World's Dairy Congress.

This experimental dairy is run like an ordinary factory, and receives about 3,000 gallons of milk daily from 190 odd farms, representing about 1,200 cows. The plan and lay-out of the factory is similar to the modern up-to-date factories I visited in Jutland and Zealand, and besides the manufacture of a considerable amount of butter, cheese, chiefly of Gouda and Gruyere types, is manufactured. The method of pasteurisation here is the flash system, using a temperature of about 195 deg. Fahr., and I believe that this system is practically universal throughout Denmark, and wherever I discussed pasteurisation the opinion was emphatic that the flash system was much preferable to the holding system for cream for butter making. There is, however, considerable research work going on at present with low temperature holding system pasteurisation for fresh milk for household use, in which Professor Orla Jensen is taking part, and there is a strong feeling that this is the better system for that purpose in Denmark. The atomising system of pasteurisation, about which I will furnish a report later, was fully tried out at this factory. The plant had been dismantled and removed at the time of my visit. I hope shortly to receive the full report of its trial at this station from the agents who are having it prepared in English.

I saw here also a test of recent origin, the Hoyberg single liquid method for determining the butter-fat content in milk, to be used in place of the Gerber or Babcock tests, which had been tried out, and a full report made of its value as compared with the Gerber test at this factory. I am forwarding a report of the manager of the results of these investigations, in the form of a booklet, in which, on pages 40-41, appears a summary in English.

The management of this factory is in close touch with other Government scientists in dairying, and it is here that the practical test is applied to investigate modern methods of manufacture or science in bacteriology or chemistry of dairying, as well as new inventions of dairy machinery. It was at this factory that I was able to see milk inoculated with various starter organisms, amongst them being betacoccus, which does not produce acid when growing in pure milk by itself. It needs no stretch of imagination to realise the great importance of such an institution to the dairying industry in Denmark, and the difficulties under which experts and scientists in Australia must labour without one. One cannot too strongly urge Australia to establish at least one of these research stations.

Agricultural Education.

The need for facilities for educating the young people of Denmark in agricultural matters is met, firstly by the establishment of what are termed High Schools, where students of between eighteen and twenty-five years of age attend short courses mostly on agricultural subjects, and secondly, by the Agricultural Schools, providing higher agricultural education, principally for graduates from the High Schools. There are nineteen Agricultural Schools, with a yearly attendance of about 2,400 pupils. These schools are privately owned, but are subsidised by the Government, which also provides a number of scholarships yearly. These schools can be attended only by those who have been employed in butter factory work for a period of four years.

A full scientific training in dairying is obtainable at the Royal Veterinary and Agricultural College, at Copenhagen, which is a Government institution, the course at which occupies from two to three years, and it is at this college that quite a number of the scientists and advisers in Danish agriculture have graduated.

Agricultural Co-operation in Denmark.

Denmark is perhaps the greatest example of successful co-operation, especially in the dairying industry, of any country in the world, and it is principally through this system of getting together for mutual self help amongst the producers, and especially the small producers in Denmark, that the dairy industry has become so successful.

It was with a view to standardising dairy production that small peasants in Western Jutland formed the first co-operative creamery and dairy society in the year 1882, and from this beginning the co-operative system has grown until there are now 1,400 local dairy societies on a strictly co-operative basis, uniting under this heading nearly 200,000 farmers, or 90 per cent. of the industry. The chief principles of their co-operative system are as follow:—

(*a*) The members bind themselves for a certain period, usually ten years, to deliver to the society all milk produced in excess of that used in their homes.

(*b*) All members are jointly and severally liable.

(*c*) The profits are divided in proportion to the amount of milk delivered.

(*d*) Membership is open to all milk producers.

(*e*) Each member has but one vote.

(*f*) The general assembly is the supereme authority in the society's affairs.

The average society has about 150 members, representing approximately 900 cows. The co-operative idea after a while amongst producers was found so beneficial that its development soon included in its assisting powers many farm activities and requirements, such as herd testing associations, bull clubs, horse-breeding societies, cattle export societies, the purchase of feeding stuffs, manure supply, coal supply, farm seeds, and wholesale societies covering most of the requisites of farm and factory, until later co-operative banking institutions were included, and the export and selling of the butter was finally largely brought under the co-operative system.

BUTTER MAKING FOR HOME CONSUMPTION.

In the parts of this State where dairying is in general practice, it has become the custom to forward the cream raised on the farm to a butter factory, where the cream is received, treated, and manufactured into butter. To those supplying cream in this way to the factory, the process of manufacture of small quantities of butter on the farm is generally well understood. However, there is a number of persons scattered throughout the State who milk one or more cows, and have neither the desire nor the opportunity to tender the cream from the milk to a butter factory, but on the other hand, they are anxious to make butter from the cream. Frequently, advice upon the procedure to be followed in so doing is sought from this office, and it is with the object of meeting inquiries of this nature that the subsequent simple particulars are supplied relative to the production of milk and cream, and the manufacture of the latter product into butter. The more important matters for observation will be referred to in their natural sequence.

Primarily it must be understood that the flavour of butter is influenced by—(*a*) the class of food to which the cows have access, (*b*) the degree of cleanliness practised in the handling of the milk and cream, and the skill exercised in the manufacture of the butter.

Many varieties of weeds and some useful fodders are capable of conveying objectionable flavours or taints to milk, and, in turn, the tainted flavour is noticeable in the cream, and ultimately the flavour of the butter is affected.

The tainting influence of fodders is minimised by feeding same to cows directly after milking, but not immediately preceding same.

Thorough cleanliness is necessary to prevent contamination of the milk or cream. The cow-bail and place where the cow is milked must have an impervious floor, and be kept in a clean and sweet condition. The udder, teats, and flanks of the cow should be washed and wiped prior to milking. The hands of the person who intends to carry out the milking should be cleansed similarly.

The milk should never be exposed to an impure atmosphere.

Strain the milk without delay after it is drawn from the cow by running it through a very fine-mesh gauze or, preferably, through a strainer fitted with a wad of sterilised cotton.

The milk should next be passed through a separator, or set in dishes to allow it to cream, the separator proving by far the more satisfactory means of obtaining the cream. If setting of the milk in dishes has to be resorted to, it will be found that shallow dishes, which provide a comparatively large surface for the cream to gather upon, are more satisfactory than deeper vessels with a limited surface.

Generally the milk is allowed to sour, or even coagulate, before the cream is skimmed off, but no more cream can possibly rise to the surface after the milk has thickened. The layer of cream is removed with the aid of a utensil termed a "skimmer," the customary makeshift being a tablespoon. The objective should be to collect as much cream as possible, but to avoid gathering any of the milk with it.

The cream is best placed in an enamel vessel and should be kept as cool as possible. It must not be brought into contact with a tainted atmosphere, for the cream readily absorbs odours from such a source.

It is advisable not to mix the cream obtained by individual skimmings, or separations of the milk, until some hours before churning time, when the whole of the cream available for churning should be placed in one receptacle, and allowed to ripen uniformly. Always avoid the mixing together of hot and cool cream.

A certain amount of lactic acid should be permitted to develop on the cream before churning, and this usually requires from thirty-six to forty-eight hours, according to the care taken and the temperature at which the milk and cream are held. Holding either milk or cream at comparatively high temperatures expedites the development of the acidity.

Generally natural temperatures in Queensland, particularly during the warmer season of the year, are too high to give satisfactory results in the churning of cream, and to remedy this difficulty, artificial cooling of the cream by the aid of an ice-chest is advantageous. The water used for butter-washing purposes may be placed in a vessel and similarly cooled in the ice-chest. A more primitive means of cooling the cream is to stand the vessel containing it in water drawn from an underground well or spring; another method is to make a canvas jacket to cover the vessel holding the cream, and to arrange that the edges of the canvas covering reach a supply of water, which is drawn up by capillary attraction, and acts on the same principle as the cooling of water in a water-bag.

Usually good results in churning are obtainable by having the cream at a temperature of 56 degrees to 58 degrees Fahr. during the cooler months of the year, and reducing the temperature of the cream preparatory to churning several degrees lower throughout the warmer season.

In butter-making there are certain requisites and appliances that must be provided, even in cases where primitive methods are practised. Firstly, an ample supply of both hot and cold water must be available. The cold water is necessary for the purpose of washing the butter, and the hot water is required for use in cleansing and scalding the dairy utensils.

The water may be drawn from either a tank or well supply, provided it is wholesome. What is known as "hard" water from a well supply may be employed for washing the butter, so long as this condition of the water is caused by the presence of salt or limited percentages of other mineral matter, not injurious to health. Water containing decayed vegetable matter should not be used for washing butter.

To recover the cream from the milk, either milk setting-pans or a separator is required. The setting of milk in pans to allow the cream to rise is not to be viewed as a satisfactory or economical method of recovering cream from milk. In the first place, there is the risk that the surface of the milk will catch a deal of fine dust particles from the atmosphere while awaiting for the cream to rise; another disadvantage is, that a large percentage of the butter-fat content of the milk is not recoverable by this method. A small-sized separator provides by far the more advantageous means of recovering the butter-fat from milk. Separators of a wide range in skimming capacity are procurable, and one should be secured of a capacity in agreement with the complement of milk to be treated.

A churn is necessary. There are many types of churns that have been designed to meet the requirements of those who desire to churn, for their own use, small quantities of cream. Generally, all are capable of churning satisfactorily. For convenience, the churn should be simple in construction, durable, and so designed as to be readily cleansed.

Two butter pats for use in working and salting the butter should be provided.

Hand power butter-workers are procurable on the market, but such appliances (while admittedly most serviceable) are more suited to cases wherein the operations of the butter-maker are carried on in a comparatively large scale. In instances where it is intended to manufacture sufficient butter to satisfy the requirements of a family, the two pats are to be made to perform successfully the working and patting of the butter. This process can be carried out in a clean shallow dish if so desired.

A dairy thermometer is a most useful article, and should be included in the equipment of the dairy; and by its aid the temperatures of cream or water may be determined from time to time.

Churning is simply a mechanical process for bringing together the butter-fat globules in the cream in order to make them coalesce or unite. Preparatory to the churning of cream, the utensils used in connection with the process should be dipped in scalding water and then rinsed in clean cold water.

The whole of the cream from the various skimmings or separations of the milk (that should have been cooled and mixed in a container for some hours prior to churning time) is placed in the churn and the churn is put into operation.

If the churn is of a design that allows the operator to view the cream while churning, it will be noticed that, after some little time under the churning process, the cream will assume a paste-like consistency and possess a smooth texture. At a later stage the cream will appear to increase in density, and subsequently the texture will appear gritty. This gritty appearance of the texture of the cream is occasioned by the unison of the fat globules, and indicates that the churning is nearing completion. Care should be taken at this stage that no cream is allowed to remain stationary on the sides of the churn, and any cream attached thereto should be removed and brought under the influence of the "paddles" of the churn with the main bulk of the cream. Otherwise a portion of the cream will remain unchurned, and be carried away and lost with the butter-milk.

As soon as the cream "breaks," it is advisable to add a small quantity of cold water to flush the sides and paddles of the churn, using about half a pint of water to each quart of cream in the churn. Carry on with the churning process until the globules gather in particles about the size of a grain of wheat. Now stop the churning and allow the butter to float upon the butter-milk, which should then be drawn off. In the case where the temperature of the cream is higher than it should be for correct churning, the butter-fat fails to assume a granular appearance, but gathers rather in the form of a mass of soft fat. However, this does not call for any change in the procedure in so far as the draining off of the butter-milk is concerned. When this is done, add wash water to the churn, and wash the butter, working the butter with the pats in order to eliminate the butter-milk as thoroughly as possible. The temperature of the wash water should be several degrees below that specified for the cream. It is well to remember that the incorporation of an excessive amount of butter-milk in the butter will result in the keeping properties of the latter being prejudicially affected.

In some cases a second washing of the butter is advantageous, but this is dependent upon the degree of success attained in removing the butter-milk in the first washing. After the washing of the butter has been effected, add fine salt to the butter in the proportion of from three-eighths to half an ounce of salt to each pound of butter.

Work the butter steadily with the pats, taking care not to injure the grain of the butter more than is necessary in expelling the excess of moisture. The working also mixes and incorporates the added salt with the butter.

If the churning of the cream has been carried out efficiently and correct temperatures observed and the butter properly washed, the moisture showing in beads on the finished article will be in the form of a crystal clear brine.

The butter is now ready for use, but as it is capable of absorbing odours given off by other strong flavoured foodstuffs, it should be stored away beyond attack from such influences in clean surroundings and kept as cool as possible.

CONTAGIOUS PNEUMONIA IN PIGS.

COMMON PREDISPOSING CAUSES.

"All coughing pigs should be regarded with suspicion. Healthy pigs do not cough frequently, and the fact that pigowners have formed the opinion, expressed in many districts, that it is normal for pigs to cough is an indication of the extent of the infection with contagious pneumonia."

This passage is extracted from a pamphlet issued by the New South Wales Department of Agriculture, concerning a condition of particular importance now that the cooler period of the year is approaching. Contagious swine pneumonia is an infectious disease which is characterised by inflammation of the lungs and the membranes lining the chest cavity and covering the lungs. The casual organism may frequently be present in small lesions in the lungs of apparently healthy pigs, and no harm appears to be caused by its presence there until the animal is subjected to unfavourable conditions which lower the body vitality and resistance to disease. These unfavourable conditions are associated with faulty management, and include:—

1. Damp low-lying situations for piggeries and yards.
2. Inadequate shelter and consequent exposure to inclement weather.
3. Damp cold floorings in sties;
4. Inadequate diet.

In addition it must be remembered, states the pamphlet referred to, that the condition when established is definitely infectious, and the introduction of an infected pig into a piggery is sufficient to cause a widespread loss from pneumonia.

The symptoms shown vary according to the form of the disease, which may be acute, sub-acute, or chronic. Diagnosis is not easily made in an isolated case, but presents no difficulty if a number of pigs are affected. Rapid breathing, coughing, discharges from the eyes and nose in the live pigs, and characteristic findings in the chest on post-mortem examination indicate that contagious pneumonia is the cause of sickness or death. The disease with which it is most likely to be confused in New South Wales is swine fever, since this is also an infectious disease in which the lungs may be involved. Swine fever, however, is a much more serious disease. Both are scheduled under the Stock Diseases Act, and must therefore be reported to the District Stock Inspector, who will take the necessary steps to see that a correct diagnosis is made.

Treatment of sick animals with medicaments is not advised. Pigs slightly affected make a rapid recovery. Where pigs are more severely effected, it is not profitable to try and cure them. Many die, and those that do make a recovery are generally stunted, unthrifty, and slow to fatten. From an economic point of view it is better to destroy them at once.

BALLANITIS IN SHEEP.

Replying to a correspondent, Mr. J. A. Rudd, L.V.Sc., of the Veterinary Staff, had this to say of a common ailment in sheep:—The wethers are suffering from Ballanitis or big pizzle, which is the common term wrongly applied to the prepuce, which is the covering externally of the penis and which in large measure protects this important organ from traumatic injury, and which is chiefly affected primarily, but ultimately, in sympathy or by direct contact, a certain amount of inflammatory oedema appears on the penis itself. The question naturally arises: What is the cause? And many and various theories have been propounded from time to time by laymen who are at times accepted as keen observers who know all about sheep. There is no doubt, however, that the one and only cause beyond all doubt is the persistent shearing away, especially since the advent of the machine shears, of the hairs which grow on the prepuce for one special purpose, and that is to drain the urine away and thereby prevent it spreading on the surrounding skin. The spread of the urine causes fissures or cracks to form around the prepuce. This is termed by some as "scalding." These fissures in time become contaminated with filth, dust, and flies, and the irritation compels the sheep to rub on any projections in the paddock such as low stumps or even on the ground, with the result that the condition becomes rapidly worse and spreads.

Prevention is by far the best method, and lies in the direction of explaining to those who shear the sheep the result of their bad work. Every sheep (wether) should be examined after he is shorn and this particular part dressed with zinc ointment (1—8) if the drainage hairs have been removed. I have also noticed that in some instances the whole prepuce has been cut clean away and the pizzle exposed. These sheep should also be dressed and carefully tended for a day or two before being returned to the flock.

Once the sheep is affected, the best practice is to shear the wool away all around the affected part and up towards the scrotum, cleanse this thoroughly with common household soap and water containing 1 dessertspoonful of phenyle to 1 gallon of water, taking care to remove all debris or decaying skin and tissue. Make a start with the scissors made for the purpose and run straight up to the limit or a very little beyond where the pus is seen to burrow. Having done this, cleanse the wound once again with the solution as recommended or, better still, with a solution made up with 1 teaspoonful of salt to 1 pint of water, adding 1 tablespoonful of phenyle to every gallon of salt solution.

The main object of using the phenyle is to keep flies away, the smell being sufficient for the purpose. If the wethers are turned out into a good grass paddock and brought in after three days and dressed once again this is generally found sufficient to effect a cure.

They should not be turned out into a dirty, dusty yard after being cleansed, but straight out over the fence and into a grass paddock. If they are caught in a yard they should be cleansed outside. An improvised hurdle yard away from the homestead is by far the better place for making a success of this treatment.

I do not think that there is anything lacking in the soil, but a good deal is lacking in care of the sheep during shearing. Big tallies are useless if sheep are cut about and exposed to injuries which are avoidable. If it is thought the soil is the cause of the affection, or is an aid in this direction, a sample of the soil should be sent down to the Agricultural Chemist for analysis and report.

A good method of discovering affected sheep in a mob is to start them ringing, when the pressure of the mob will cause the affected animals to seek relief by working their way painfully towards the circumference of the ringing mob.

A USEFUL JOURNAL.

In renewing his subscription a Willow Tree farmer writes (8th February, 1930)*:—*

> *"I find the Journal most useful and a great help."*

On the same date a Kandanga farmer also writes:—

> *"We have every Journal since* 1924*, and should not have liked to miss one. We always look forward to receiving each copy, and have had a lot of useful information from every one of them."*

DISEASES IN PLANTS ACT.

NEW REGULATIONS PROCLAIMED.

All Proclamations and Regulations under the Diseases in Plants Acts have now been rescinded and new Proclamations and Regulations issued in lieu thereof. The first Proclamation states that the Act of 1929 shall come into operation on the 27th February, 1930. Other Proclamations deal with the declaration of certain pests and diseases under the Act, the defining of certain fruit districts, the prohibition of the removal of banana plants without a permit, the introduction of grapes (fruit) from New South Wales and Victoria, the prohibition of the introduction of Codlin Moth or Fruit Fly into the Stanthorpe fruit district, the introduction or removal of plants affected with symptoms denotive of Crown Gall or Hairy Root, the introduction into Queensland of wheat for seed purposes, the declaration of sugar-cane quarantine districts and conditions of interchange of sugar-cane plants.

An Order in Council has also been drafted whereby it is compulsory that the owner or occupier of a banana orchard used for the purpose of obtaining a monetary return therefrom, shall, on or before the 31st March in each year, make application to have his orchard registered. The sum of 5s. shall be charged for such registration, and the money so obtained shall be placed to the credit of the Banana Industry Fund.

The Regulations state that no trees or plants or portions thereof, other than fruit and vegetables, shall be introduced into Queensland at any place other than the places of entry, such places of entry being Brisbane, Cairns, Rockhampton, Bowen, Townsville, Wallangarra, and such other places as may be appointed by the Minister. On its arrival at its destination, every tree or plant introduced into Queensland, and every cover, wrapper, and container thereof shall be taken into a place of quarantine for examination, inspection, treatment, or destruction. A Regulation has been made prohibiting the exporting or importing of potatoes, unless they are accompanied by a certificate declaring such potatoes to be free from specified diseases.

All cases, crates, bags, &c., containing fruit, vegetables, or plants imported into Queensland must be legibly marked, showing the grower's or exporter's name and address, all letters or figures to be not less than half an inch in length.

Any fruit which is found on inspection to be slightly diseased may be used by fruit preservers for manufacturing purposes only.

Regulations have been included which deal with the fumigation of fruit for export purposes, and directions are given for such fumigating.

Every nursery must be registered, and the fees payable will be:—

In cases where the area actually devoted to the raising of plants does not exceed ½ acre, 10s.

Where the area does not exceed 1 acre, 15s.

Where the area exceeds 1 acre, an extra 5s. for each additional acre or part thereof.

No person shall be allowed to remove any tree, plant, vegetable, or fruit thereof from the district of Bowen until it has been passed by an inspector. In that district the occupier or owner of land whereon cucurbitaceous plants are being grown shall once in every three days gather and collect all diseased fruits and destroy same by boiling or as otherwise ordered by the inspector.

All grape vines which are affected with the disease of Downy Mildew must be sprayed with Bordeaux or Burgundy mixture. No person shall allow fruit, whether diseased or not, to lie on the ground. The Regulations lay down certain rules to be followed in certain areas where Codlin Moth is present.

Persons discovering the presence of Bunchy Top of bananas in any banana plants on their land must at once notify the Department of Agriculture and Stock.

Instructions are given as to the spraying of potato and tomato plants, and the times for such spraying are set out in the Regulations.

The occupier of any land on which wheat affected with Flag Smut is growing shall burn all stubble of the wheat plants immediately after harvesting the grain.

QUEENSLAND SHOW DATES, 1930.

Dalby: 8th and 9th April.
Nanango: 10th and 11th April.
Oakey: 11th April.
Kingaroy: 15th and 16th April.
Sydney Royal: 15th to 26th April.
Miles: 16th April.
Chinchilla: 22nd and 23rd April.
Kalbar: 26th April.
Charleville: 30th April and 1st May.
Beaudesert: 30th April to 3rd May.
Wondai: 1st and 2nd May.
Wowan: 1st and 2nd May.
Goombungee: 2nd May.
Taroom: 5th to 7th May.
Mitchell: 7th and 8th May.
Mundubbera: 7th and 8th May.
Boonah: 7th and 8th May.
Murgon: 8th to 10th May.
Blackall: 13th to 15th May.
Roma: 13th and 14th May.
Goomeri: 14th and 15th May.
Gayndah: 14th and 15th May.
Wallumbilla: 20th and 21st May.
Ipswich: 20th to 23rd May.
Springsure: 21st and 22nd May.
Kilkivan. 21st and 22nd May.
Biggenden: 22nd and 23rd May.
Maryborough: 27th to 30th May.
Emerald: 28th and 29th May.
Toogoolawah: 30th and 31st May.
Marburg: 3rd June.
Childers: 3rd and 4th June.
Gin Gin: 5th to 7th June.
Bundaberg: 12th to 14th June.
Lowood: 13th and 14th June.
Miriam Vale: 16th and 17th June.
Gladstone: 18th and 19th June.
Mount Larcom: 20th and 21st June.
Rockhampton: 25th to 28th June.
Pine Rivers: 27th and 28th June.
Mackay: 1st to 3rd July.
Kilcoy: 3rd and 4th July.
Gatton: 9th and 10th July.
Woodford: 10th and 11th July.
Townsville: 8th to 10th July.
Cleveland: 12th July.
Barcaldine: 15th and 16th July.
Charters Towers: 16th and 17th July.
Caboolture: 17th and 18th July.
Rosewood: 18th and 19th July.
Ithaca: 19th July.
Laidley: 23rd and 24th July.
Nambour: 23rd and 24th July.
Esk: 25th and 26th July.
Ayr: 25th and 26th July.
Maleny: 30th and 31st July.
Royal National. 11th to 16th August.
Crow's Nest: 27th and 28th August.
Imbil: 3rd and 4th September.
Malanda: 5th and 6th September.
Gympie: 10th and 11th September.
Redcliffe: 12th and 13th September.
Beenleigh: 19th and 20th September.
Rocklea: 27th September.
Kenilworth: 27th September.

THE WORLD'S COTTON SITUATION.

Warnings of the danger to America of twenty years of almost steady deterioration of the average quality of its cotton crop, as contrasted with the efforts of other lands to improve staple grades as well as to enlarge production, are sounded by Professor John A. Todd, of Liverpool, England, in an analysis of "The World's Cotton Situation," announced recently by the Association of Cotton Textile Merchants of New York.

Weevil damage in the United States has affected quality as seriously as quantity. Due to it this country has turned to heavy-yielding cottons of early maturity, with the "Half-and-Half" variety commanding a market of sorts in domestic and Continental mills at the expense of America's better cottons. On such cotton recent short Indian crops have accounted for good prices thus far, which will be reduced on a bumper crop in India, with India and other countries able to grow more cheaply these grades that are entirely out of place in America.

Analysing the world crop according to staple, Professor Todd finds that in the fine 1½-inch to 2-inch staple, America has had no substantial part since the failure of the Sea Island crop due to the weevil. The Pima crop has recovered from the slump of 1920 to only about 25,000 bales, against 100,000 in 1930. Egypt accounts for this division with one-third of its crop of Sakel quality and with steadily increasing supplies of such grades in the Sudan. In 1¼-inch staple there has been a marked increase in Upper Egyptian cotton, lowering the price of this and East African and Peruvian growths.

In the great American middle grade, the largest new development is in India, where 1,500,000 to 2,000,000 bales per year are now of 1-inch staple. The Argentine crop has shown a marked increase in quality and has proved desirable in Lancashire in the place of good Texas cotton. Promising conditions for this grade exist in South and West Africa, Australia, Mespotamia, and the Southern Sudan. In short staples India and Korea have developed, with transportation improving future possibilities in the entire sub-tropical belt.

Answers to Correspondents.

BOTANY.

The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—

Gymple District Plants Identified.

B. (Gympie)—

1. *Smilax australis*, a species of Supple Jack or Wire Vine, not known to be poisonous.
2. *Pteridium aquilinum*, the Common Bracken Fern. The common Bracken is known to cause harm to stock, but only when they eat it in any quantity. It is not likely under the present circumstances that stock would eat enough of it to cause any trouble.
3. No specimen received bearing this number.
4. *Asclepias curassavica*, the Milky Cotton Bush or Wild Oleander, generally regarded as poisonous, but rarely eaten by stock in sufficient quantity to cause harm.
5. *Stephania hernandiæfolia*, the Tape Vine or String Vine, poisonous to stock.
6. *Desmodium* sp., a species of Tick Trefoil. These are generally regarded as useful plants in the average mixed native pasture.
7. *Lantana Camara*, the Common Lantana, when eaten in any quantity causes the disease in stock known as Pink Nose, but apparently large quantities would have to be consumed before trouble arises.
8. *Richardsonia scabra*, Mexican Clover. This plant is a native of tropical America and the southern United States. In the latter country it has been boomed as a fodder, but it is not in any way related to the true clovers, and our experience here is that stock rarely touch it.
9. *Lespedeza cuneata*, a native legume generally regarded as a useful fodder.
10. Same as No. 9.
11. No specimen was received bearing this number.
12. Fungus, impossible to determine from the specimen sent, as when it reached us it was represented more or less by a stain on the paper. Very few fungi are poisonous.
13. *Erechthites valerianæfolia*, the Federal Weed or Commonwealth Weed, not poisonous.

One specimen was received without a number. It was *Erigeron linifolius*, generally known as Rag Weed. It is not poisonous.

The specimen of decayed wood you sent we cannot determine from the material, but if anything can be done with it later on will let you know. We do not think this likely to be the cause of the trouble to which you refer.

The collection is very typical of plants growing on North Coast Line farms. If any is the cause of the trouble, we are inclined to suspect No. 5, the Tape or String Vine, *Stephania hernandiæfolia*.

Rattle-pods. *Glycine tabacina.*

R.C. (Ubobo, via Gladstone)—

No. 1 is *Crotalaria trifoliastrum*, the Small Rattle-pod. The Crotalarias or Rattle-pods are a genus of plants of which several are known to be poisonous. The one you send has come under suspicion once or twice though nothing very definite has been proved about it. In view, however, of the dangerous character of members of the genus it is as well to eradicate it from the paddocks to which the stock have access.

No. 2 is a small leguminous vine, *Glycine tabacina*, very common in the mixed native pastures of coastal Queensland and generally regarded as a very useful fodder. Though fairly common we have not heard a common name applied to it.

Poisonous Weeds.

A.A. (Pialba)—

No. 1 is *Trema aspera*, the Peach-leaf Poison Bush or Wild Peach. This plant at times develops a prussic-acid-yielding glucoside in much the same way as in young Sorghum, Soudan Grass, &c., and if eaten in any quantity at this time may cause trouble. What controls the formation of the poison in the plant is impossible to say; sometimes it is present, sometimes absent. This plant is exceedingly common in coastal Queensland, and stock often eat large quantities of it without ill effects following.

No. 2 is *Gomphocarpus fruticosus*, the Cape Cotton or Balloon Cotton. This plant often comes up very thickly on scrub farms to the exclusion of other undergrowth. It belongs to a dangerous family of plants and is generally regarded as poisonous to stock. Stock, however, rarely eat it in sufficient quantities to cause trouble.

No. 3 is *Solanum stelligerum*, the Devil's Needles or Needle Bush. All our species of Solanum may be looked on with suspicion, as they contain a poisonous principle, particularly the green berries, but losses of stock from eating these plants, common as scrub undergrowth in coastal Queensland, are very rare.

No. 4 is *Asclepias curassarica*, the Milky Cotton Bush or Wild Oleander, a very common weed in Queensland belonging to the same family as the Cape Cotton (No. 2). It, however, is rarely eaten in sufficient quantities to cause harm.

The plants you send are common ones of secondary growth in scrub country in coastal Queensland, and to a less extent on the better-class forest country. Losses of stock commonly occur on country where these plants are growing in abundance, and it is as well to clear them out if possible. The stomach contents have been handed over to the Agricultural Chemist for report.

Bull-head Grass.

INQUIRER (Allora)—

Your specimen of Bull-head Grass is *Cenchrus carolinianus*, the American Burr Grass or Sand Burr Grass, a native of the United States, and regarded there as a bad weed. This is the first time apparently it has made its appearance in Queensland. Unfortunately, its burrs, which contain the seed, are readily carried about by all classes of stock, and thus the plant is distributed.

Giant Couch.

D.A.L. (Mackay)—

Your specimen is *Panicum muticum* or Para Grass, commonly known in Queensland by its botanical name or sometimes as Giant Couch. It is one of the best grasses we possess for dairying and general stock-raising purposes along the coastal belt of North Queensland. The percentage of fertility in the seed is very low and hence propagation is generally effected by means of root cuttings or by division.

Rhynchosia minima.

R.H.F. (Bowenville)—

Your specimen is *Rhynchosia minima*, a creeping legume very common in the Downs country. It is not known to have become a pest, but is generally looked on as a useful plant in general mixed native pasture. Though the plant is moderately common we have not heard a common name applied to it.

Australian Eryngo.

D.C. (Dalveen)—

Your specimen is the Australian Eryngo (*Eryngium expansum*), a moderately common weed in Queensland, most abundant in the Stanthorpe area. Though a heavy seeder it does not seem to make itself a pest to the extent one would suppose, and as it has no particular value it should be destroyed where seen.

White Oak, or "Wheel of Fire."

A.T. (Mudgeeraba)—

Your specimens represent *Stenocarpus sinuatus,* the Wheel of Fire or White Oak, one of the handsomest of our native flowering trees. Propagation is by means of seeds, but growth in the early stages of the tree is rather slow. The tree belongs to the Silky Oak family, Proteaceæ, and possesses a whitish wood with a Silky Oak grain, rather pleasing to people fond of timber of the Silky Oak type, though not too highly figured.

Chinese Goosberry. Arjun Tree.

INQUIRER (Brisbane)—

Your specimen is *Averrhoa carambola,* the Carambola or Chinese Gooseberry, a small tree, native of tropical America, widely cultivated. In India the fruits are said to be candied and made into pickles; also used as most things are in that country in curries. It is not common here, and is only grown as a curiosity, and the fruits do not seem to be used.

The dried fruit from the Maryborough Gardens is *Terminalia arjuna,* the Arjun Tree, a native of India and regarded as a valuable timber tree there.

Plants from Pittsworth Identified.

INQUIRER (Pittsworth)—

No. 1 is *Gaura parviflora,* the small-flowered Gaura, a plant of the Evening Primrose family, a native of the southern United States—Texas, Missouri, New Mexico, &c. We have only received it once before from any Queensland locality, and that was Charters Towers. It has the possibility of becoming a weed pest, but not to the same extent as the Wild Mint, another importation to your district from the United States.

No. 2 is *Bassia Birchii,* the Galvanised Burr.

No. 3 is *Bassia quinquecuspis.* This is the plant now most commonly known in Queensland as "Bindy-eye"—a name, however, in very general use for many burr plants.

Cockspur Thistle.

J.J. (Redbank Creek, Esk)—

Your specimen is the Cockspur Thistle or Saucy Jack (*Centaurea melitensis*), a native of the Mediterranean region, now common in most warm countries. In Queensland it is abundant on the Darling Downs, and is still more abundant in the Southern States. It is one of the worst weed pests we possess, and if possible should be eradicated on its appearance in fresh localities. Eradication should be done prior to seeding.

A Widely Distributed Grass (*Chrysopogon Gryllus*).

N. (Warra)—

The grass is *Chrysopogon Gryllus,* a species widely distributed in Queensland and also occurring in New South Wales, but though it has a wide distribution we have never seen it abundant in any one locality. It is generally regarded as a useful pasture grass, and is said to improve a good deal in cultivation. In spite of its utility and general spread we have not heard a common name given to it.

Rattle-pod (*Crotalaria incana*).

E.A. (Nerang)—

Your specimen is *Crotalaria incana,* a species of Rattle-pod. It has several times been suspected of poisoning stock in Queensland, and though nothing definite is known about this particular species, as several members of the genus Crotalaria have definitely been proved poisonous to stock both here and abroad, it is as well to look on the plant with suspicion and cut it out from paddocks in which stock are grazing.

Wild Cherry (*Vitex acuminata*).

J.E.E. (Mundubbera)—

Your specimen is *Vitex acuminata*, a small tree very common in the drier scrubs of Queensland, and commonly known as Wild Cherry, though this name is applied more appropriately to some other native plants. The pretty red fruits are not edible, having a nauseating taste though they are not known to be poisonous.

PIG RAISING.

(*Selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.*)

Points in Pig Management.

W.Z. (Numinbah, Nerang)—

We regret that you have had trouble among your pigs, and have been compelled to destroy the boar. Under the circumstances, we suggest your erecting entirely new sties and providing a good pig paddock on a fresh site, and keep all new purchases away from the other pigs on the farm, for only in this way are you likely to get rid of infection and carry the new stock without undue risk.

The provision of a really good pig paddock of from one-half to one or more acres in extent would be well worth while and would not only be economically sound, but would permit of the development of healthy stock under conditions favourable to early and profitable development. Your storekeeper would quote you for suitable wire netting, and simple shelter sheds would be quite satisfactory without the necessity for more expensive sties.

The growth and use on the farm of as much of the food supply as is possible is advised, and until you are quite certain (by tuberculin test) that there is no risk of infection through skim milk, we recommend that the milk should be always scalded and cooled down before feeding the pigs.

Tuberculosis is a dangerous disease and it is quite impossible to state there is no risk of infection from unclean sties, &c.

DAIRYING.

Selected from the outgoing mail of the Supervisor in Dairying, Mr. Chas. McGrath.

Points in Dairy Cattle Breeding.

A.E.T. (Byrnestown)—

Generally it is not advisable to breed back a sire to his own progeny, which is inbreeding of stock. This practice of inbreeding has been practised by breeders skilled in the selection and mating of stock. It must be kept in mind that while desirable characteristics may be intensified, undersirable features may also be increased. In line breeding, as in inbreeding, the matter of constitution has an important bearing. It is advisable for other than skilled breeders to restrict themselves to line breeding.

I am forwarding to you, under separate cover, a copy of the ''Agricultural Journal'' for December, 1928, on page 592 of which you will note an article dealing with the selection and breeding of stock, with which is a table illustrating the principle of line breeding.

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

General Notes.

The Dairy Produce Act—Its Application Extended.

An Order in Council has now been passed under *"The Dairy Produce Act of 1920"* bringing that Act into force in the areas of the following local authorities:—Cities: The cities of Townsville and Charters Towers. Town: The town of Bowen. Shires: The shires of Johnstone, Cardwell, Hinchinbrook, Thuringowa, Dalrymple, Ravenswood, Ayr, Wangaratta, Proserpine, Mirani, Sarina, Broadsound, Livingstone, Douglas, and Eidsvold.

Staff Changes and Appointments.

The Officer in Charge of Police at Charters Towers has been appointed an Acting Inspector of Stock, as from 15th February, 1930.

The appointment of Mr. J. H. Gregory as an Instructor in Fruit Packing, Department of Agriculture and Stock, has been confirmed as from 1st August, 1929.

Mr. H. St. J. Pratt, Instructor in Fruit Culture, Stanthorpe, has been appointed also an Inspector of Stock, as from 15th February.

Mr. C. A. Joseph, of Diamond Valley, Mooloolah, has been appointed an Honorary Inspector under the Diseases in Plants Act.

Mr. S. W. Buhot, District Inspector of Stock, Toowoomba, has been appointed Government Representative on the Darling Downs Dingo Board.

The Officer in Charge of Police at Fossilbrook, North Queensland, has been appointed an Acting Inspector of Stock.

Sugar Industry—An Amended Regulation.

An amendment to Regulation 147 under and for the purposes of *"The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1928," has been made. The old Regulation 147 read as follows:—

"147. At the election in March, 1927, each Mill Suppliers' Committee, District Executive, and the Queensland Cane Growers' Council shall be elected for a period of three years, namely, for the period to the 31st March, 1930."

Regulation 147, as above, has now been rescinded, and the following has been approved in lieu thereof:—

"147. At the election in March, 1930, each Mill Suppliers' Committee, District Executive, and the Queensland Cane Growers' Council shall be elected for a period of three years, namely, for the period to the 31st March, 1933."

The Banana Industry Protection Act.

A Proclamation has been issued proclaiming the date of commencement of *"The Banana Industry Protection Act of* 1929" as the 27th February, 1930, and forty-six regulations have been made under the Act, and which are summarised thusly:—Regulations 1 to 22 deal with the transaction of business at Board meetings; 23 and 24 deal with a quorum. One representative of the Government and one representative of the growers shall form a quorum; 25, growers' representatives shall hold office for two years; 26 deals with fees. Growers' representatives shall be paid one guinea per day for each sitting or day occupied in the Board's business, plus travelling expenses at public service rates; 27, up to the 31st August the growers' representatives shall be nominated by the Committee of Direction. Their term shall cease on the 31st August, 1930; 28 to 44 deal with the election of growers' representatives, who shall hold office from the 1st September, 1930; 40, rolls of registered banana-growers entitled to vote shall be subject to the approval of the Minister; 45, all general records shall be kept in the Office of the Department of Agriculture and Stock; 46, all agreements shall be signed by the chairman or deputy chairman and be countersigned by the secretary.

The following appointments have been made to the Banana Industry Protection Board:—

Mr. G. Williams (Director of Fruit Culture), Mr. R. Veitch (Chief Government Entomologist), Government representatives;

Mr. K. R. Hack, Nerang, and Mr. A. E. Maher, Cooroy, growers' representatives;

and Mr. Williams has been appointed Chairman of the Board.

Canada Adopts Meat Grading.

An organisation for the grading and branding of beef produced in Canada has been put in operation. Two grades of beef are to be marked at the outset; "Choice," which will bear a red brand, and "Good," which will have a blue brand. The brands will be so applied that a portion of the marking will be present on any retail cut, so that the smallest consumer will be able to buy a graded product.

A recent report states that the new policy carries out the recommendations of the Joint Beef Committee, which was appointed by the National Beef Conference which was held in 1928.

Honey Board Nominations.

The following nominations have been received at the Department of Agriculture and Stock in connection with the election of four growers' representatives on the Honey Board:—

Brown, Alexander Roy (Park Ridge),
Campbell, John Duncan Colin (Hillview, Beaudesert),
Edwards, Charles William (Greenbank, via Kingston),
Fagg, Henry Edgar (South Killarney),
Schutt, John (Holstein Park, Perthton),
Spry, Augustus Frederick (Clayfield, Brisbane),
Tanner, Owen Norman (Samford),
Woodrow, Robert Victor (Woodford).

New Zealand Pig Products—Satisfactory Experiments.

The following interesting report on experiments recently carried out in England by New Zealand producers to manufacture good quality bacon from frozen pigs shipped from the Dominion has been received from Mr. R. H. Heywood, Commonwealth Veterinary Officer attached to the High Commissioner's Office, London:—

An experiment of considerable interest to pig producers in New Zealand and consumers in Great Britain was recently organised in London by the New Zealand Meat Board and the New Zealand Department of Scientific and Industrial Research, both of which organisations are giving every assistance in the establishment of a pig industry in New Zealand. The object of the experiment was to demonstrate that it is possible to manufacture good-quality bacon from frozen pigs from the Dominion. This is well known to a few, but it is desired to bring home to the whole body of interested producers and consumers, by actual demonstration, that bacon of a certain quality can be produced when efficiently cured. The experiment was undertaken by a prominent firm of curers, to whom the thanks of those who organised the experiment are due.

The frozen carcasses were manufactured into Wiltshire sides by standard methods of cure. The finished sides were judged by a panel of judges from the London Provision Exchange, whose report is briefly as follows:—

> The general conformation and proportion of sides were good and the colour and mildness of the bacon were excellent. The total points awarded for three types of cure were 81, 76, and 82 out of a total of 100, the first being a tank cure and the two latter dry salt cured.

These results are regarded as being extremely satisfactory.

A comprehensive series of cooking tests were kindly undertaken by the chief and staff of the King's College of Household and Social Science. Comparative cuts and joints of the three New Zealand bacons, best English and Danish, were cooked in five different ways and were submitted for opinions to a number of judges who were unaware of the origin of the samples. The final opinion of the college experts and others was that the New Zealand samples were at least as good as English and better than Danish in flavour, tenderness, and appearance. Another point of importance to the housewife was that all New Zealand samples lost less weight in cooking.

The promising results obtained from this experiment are of unusual interest in view of the publication of the Imperial Economic Committee's report on pigs and pig products, in which emphasis is laid on the potential importance of New Zealand as a source of pork and bacon. The fact that bacon of quality demonstrated by this experiment can be made from frozen pork is, to say the least, encouraging to those who organised the experiment, which should act as a stimulus to those endeavouring to substitute Empire products for foreign imports. It is of interest to note that bacon from New Zealand pork has been cured and marketed by several British curers for some years past.

They All Advertise.

The hen is not supposed to have much common sense or tact, yet every time she lays an egg she cackles for the fact. A rooster hasn't got a lot of intellect to show, but none the less most roosters have enough good sense to crow. The busy little bees they buzz, bulls bellow and cows moo, the watch dogs bark, the ganders quack and doves and pigeons coo. The peacock spreads his tail and squawks, pigs squeal and robins sing, and serpents know enough to hiss before they sting. But man, the greatest masterpiece that nature could devise, will often stop and hesitate, before he'll advertise.

Pig Returns—Can any other Reader beat this.

Mr. W. H. Nugent, of Milford, Boonah, writes:—"With reference to your paragraph in General Notes, February "Queensland Agricultural Journal," you ask if any reader can beat Mr. Skinner's returns for pigs, equalling £3 per dairy cow. My dairy herd consists of twenty milch cows, and I keep three to four breeding sows, also a purebred Duroc-Jersey boar. For 1928, my pig returns amounted to £110 8s. 3d., and for 1929 £100. Maize purchased to feed pigs during the two years cost £10. Skim milk, pumpkins, maize, sorghum, &c., grown on the farm made up the rest of the feed. The average return for pigs for the two years equal £5 per cow. Some of the pigs were sold as baconers and some as stores. I do not keep my pigs penned up; they have a free run in grassed paddocks fenced with seven barbed wires."

Improvement of Dairy Herds in U.S.A.

Some food for thought for Queensland dairymen:—The Secretary for Agriculture, U.S.A., recently stated that if the 22,000,000 dairy cows now in the United States were as efficient as the cows in the herd improvement associations, the same amount of milk produced by the above number of cows would be produced by 14,000,000 cows. The annual average of milk production of the association cows was 60 per cent. more efficient than the average cows. The average annual milk production from the 22,000,000 cows is only 4,600 lb., as against 7,417 lb. from cows in dairy herd improvement associations.

Here, it is stated, is a field for development to which the U.S.A. dairymen are fully awake, but which has enormous possibilities, as immense savings in feed and labour could be effected if the dairy industry had 14,000,000 cows sufficiently efficient to produce the present milk supply.

Although America produced in 1928 some 60,000,000 tons of milk, her net imports amounted to approximately 1 per cent. of her domestic requirements.

The Poisonous Plants of Queensland.

Running through the "Queenslander" for the last three months has been a valuable series of articles on the poisonous plants of Queensland. All the known and suspected poisonous species are being dealt with in this series, which is well illustrated, and all readers of this journal would be well advised to follow these articles regularly.

At the present time the known and suspected poisonous plants of the Natural Order Solanaceae are being dealt with. This order includes the potato and tomato, but most of the species are mere weeds and a large number are poisonous. A few of the plants are reputed to be usful in medicine.

Among the poisonous species of this family found in Queensland are the Apple of Sodom, Devil's Apple, Buffalo Burr, Wild Black Currant, Poison Berry or Cestrum, Stramonium or Thorn Apple, Purple Thorn Apple, Hairy Thorn Apple, Native Thorn Apple, Wild Tobacco, and Native Tobacco. Cases frequently come under the notice of the Government Botanist of stock being poisoned by eating the plants, and the descriptions given in the "Queenslander" should be very helpful to graziers and other readers. Sometimes a preparation made from a poisonous plant has a use in medicine, and where this is so reference is made to it in the articles referred to.

Botanical names are always given, mostly for check purposes, but otherwise the use unduly of technical terms is avoided, the articles being written in a style that can be followed easily by the average reader. In collecting his material the writer of the articles has consulted many publications, but the main source of information is the "Queensland Agricultural Journal," in which references to poisonous plants have appeared from time to time for over thirty years. Much assistance has also been given to him by the Government Botanist, Mr. C. T. White, F.L.S.

The "Queenslander," by giving attention and encouragement to this phase of scientific investigation, is performing a valuable service for the rural producer.

Canada's Increasing Trade.

According to an official report from Canada, in twenty years the Dominion's trade has multiplied eight times and Canada now leads all other nations in favourable trade balance per head of population. Her exports now amount to 133 per capita, which is one-third greater than Great Britain, and nearly four times that of the United States. It is also stated that Canada is making relatively faster economic progress than the United States.

Citrus Levy Extended.

Regulations have been issued under the Fruit Marketing Organisation Acts extending the Citrus Levy Regulations until the 28th February, 1931. These regulations were originally issued in February, 1926, and the new schedule just issued provides for the payment of a levy on the basis of the quantity of citrus fruit sold by a grower. It shall be at the rate of 1½d. a bushel case and ¾d. per half-bushel case, and 5s. per ton in the case of fruit used for fruit preserving. The levy shall be collected by means of levy stamps, which are obtainable from the head office of the Committee of Direction, Turbot street, and which shall be affixed to account sales or credit notes, or any other documents giving evidence of the sale of citrus fruits.

The levy is really a reduction of what formerly operated, in so far as the former levy was operative at 2d. per bushel case, and 1d. per half-bushel case, and 8s. a ton on fruit for preserving purposes.

Of the sums raised by the levy, an amount equal to 1d. per bushel case, and ½d. per half-bushel case, and 5s. per ton on citrus fruit sold for preserving purposes shall be expended only in the interests of the citrus fruit section of the fruitgrowing industry of Queensland, and the balance only upon advertising in the interests of the growers concerned.

Dairying Problems.

A recent deputation from the Queensland Co-operative Dairy Companies' Association to the Minister of Agriculture and Stock, Mr. Harry F. Walker, dealt with many questions, including the likelihood of the Buffalo Fly invading Southern Queensland; the uniform grading of butter; mammitis in dairy cattle and its prevention; the necessity of a bacteriologist being allowed to visit factories and also to do work at the laboratory; and the payment of subsidy, by various companies, on the railage and cartage of cream to the factories.

Mr. Walker pointed out that the Buffalo Fly was still being watched carefully by the officers of the Department of Agriculture, and the latest report proved that it had not come any further south than twelve months ago. He stated that the Department has got in touch with the Commonwealth Government on this matter, and the Commonwealth has convened a conference to be held in Brisbane on the 1st April, and invitations have been issued to representatives of owners of stock in the restricted area of Queensland and in Northern Australia adjacent to the border; representatives of the stock interests in Queensland and Northern Australia; representatives of the Department of Agriculture and Stock, Queensland, and of the Department of Home Affairs; with the Director, Division of Veterinary Hygiene of the Commonwealth Department of Health, as Chairman. Mr. Walker assured all present that the Department would be quite firm in carrying out the restrictions now imposed to prevent the fly coming any further south.

The question of grading dairy produce for local sales was brought up, and it was suggested by the deputation that the words "First," "Second," and "Third" be used in lieu of other markings which are used by some companies to-day. With regard to this question Mr. Walker promised to have further investigations made after consultation with other officers of the Department.

With regard to mammitis in dairy cattle, Mr. Walker pointed out that this matter was being attended to by Major Cory and Mr. Pound, who have conducted extensive investigations and are still continuing their investigations with the idea of finding some permanent preventive.

The request for a bacteriologist was acceded to, provided the request was general, and that the factories in return help the Department as much as possible by sending down to the laboratory whenever practicable samples of cream which requires attention.

Mr. Walker appealed to the members of the Butter Association to support Mr. Deacon (Minister for Lands) in his desire to see Queensland wood is used for butter boxes in lieu of any imported timber. Recent experiments, he said, had proved beyond doubt that Bunya and Hoop Pine were the best timbers to use and were less liable to impart wood taint to dairy products.

The Gospel of Good Farming.

Discussing the high standard of wheatgrowing practice of farmers who entered their crops in the championship field wheat competition in the northern area of New South Wales, the manager of Glen Innes Experiment Farm, who acted as judge, comments:—"The wheat position in the north is very bright. In past years the statement has been voiced that one good crop was enough to delay the advancement of scientific agriculture for a decade, because on these highly fertile soils it was possible to produce high-yielding crops in good seasons, quite irrespective of the cultural practice followed. Be that as it may, the gospel of good farming has now been accepted by the men that matter, and it is unthinkable that northern agriculture can do anything but progress. There seems now to be a complete understanding of the great fundamental fact that good farming is essential to good crops."

Increase Meat Sales—Attractive Joints.

The interest being shown by the meat industry in the wrapping and packaging of frosted and unfrosted fresh cuts is bringing to light some interesting subjects for speculation (says the "National Provisioner," Chicago, Ill., America).

Among these is the question of whether or not wrapping and packaging will increase meat consumption and enable the meat packer to get a larger profit from each carcass sold.

The general opinion seems to be that they will tend to increase meat sales. This is based primarily on the fact that when processed meats—such as sliced bacon, for example—were packaged, consumption of them increased.

When fresh meats are put up in a convenient form—with the added value of brand and grade identification—meat merchandisers believe the same factors that influenced the increased consumption of packaged processed meats and other packaged goods will apply.

More Popular Cuts.—But there is another angle to this subject that is only now beginning to be appreciated in connection with wrapping and packaging. This is the matter of getting out of each carcass more cuts for which a large popular demand can be built. This would mean, of course, a greater demand from each carcass.

One of the difficulties the packer has always had to contend with in the marketing of beef—and to a lesser extent with veal and lamb—is the growing tendency of the consumer to demand small steaks, chops, and the other better cuts. The trend toward apartment life, smaller families, the growing demands on the housewife's time, and the simplification of household tasks are some of the factors that have brought about this situation.

The live stock producer has met this demand by producing smaller animals of better quality. The packer might carry the process a step farther by redesigning carcass cutting methods so as to get from each animal more yield of cuts in greatest demand by consumers. In doing this there are chances to serve the small consumer.

Such a plan would involve more boning out than is now done. It would mean the preparation for broiling and frying purposes of cuts now boiled, roasted, and stewed.

Skewering, tying, pounding, larding, and slicing would make out of many of the boiling and roasting pieces nutritious, economical, and attractive cuts for a pan or broiler.

Goods Advertise Themselves.—Many of these cuts would approach the more expensive cuts in tastiness and attractiveness. They could be so designed that, when sliced, each slice would be sufficient for one serving. They would be econimical in that they would contain no bones, and they could be made popular.

In addition there would be a merchandising advantage for the packer who showed ingenuity in preparing well-flavoured, attractive cuts.

The consumer is not particularly interested in what part of a carcass a piece of meat comes from; but she does want meats of good quality that will be attractive when served, and that can be prepared for the table easily and quickly.

The packer who puts out new cuts in attractive wrappings and packages will have a new field of merchandising open to him. He can give his products distinctive names, and with the right kind of advertising, induce customers to ask for his products by these names. If he does this he will build a business that will be distinctively his own, because it will be based on consumer demand.

U.S.A. Commercial and Intelligence Service.

According to Mr. A. S. Hillyer, Chief of the Commercial Intelligence Division of the U.S.A. Department of Commerce, approximately 1,000 trade men in 385 foreign countries furnish him with material for his commercial and intelligence reports. The Division concerns itself with furnishing trade lists and credit references in connection with foreign trade opportunities and affects contracts with foreign buyers visiting the United States.

Why Silage Keeps.

When corn is placed in the silo, that near the surface where it is exposed to the air becomes hot. This has led to a somewhat general belief that the whole mass of silage becomes hot. However, such is not the case, according to experiments by the Bureau of Dairy Industry, United States of America Department of Agriculture. Thermometers buried at various places in the silage showed a maximum temperature of 100 deg. Fahr., which would be termed only lukewarm. Usually the silage reached its maximum temperature in ten days or less, after which it gradually cooled. It is evident, the Bureau says, that the formation of heat is insufficient to cause sterilisation, and thus aid in the preservation of silage. Rather, the silage keeps because of the exclusion of air and the action of the acids.

Defrosting of Beef.

Mr. R. H. Heywood, Commonwealth Veterinary Officer, London, has advised the Department of Markets and Transport that a representative of one of the London meat firms recently stated at a meeting of the British Association of Refrigeration that his firm had been able to sell more frozen meat in three months since it had been defrosted than in the whole of the previous year, and that although on a particular day his firm was unable to make 3s. 6d. per stone for frozen cow hindquarters, on the following day after defrosting these sold readily at 4s. 3½d.

The following notes regarding the defrosting process were handed to Mr. Heywood by the representative above referred to:—

For a trader to achieve success it is necessary to do two things: He must produce the article in which he deals in such a way as will make it desirable to his customers, and the article itself must be of such a nature as will fulfil the requirements for which it is intended.

Now, Australian beef in the past has not met these requirements; to be brought to England on economic conditions, it must be hard frozen. Feef, when cut up into joints has an unfortunate way of appearing wet from the too quick thawing of the flesh, and further, when cooked, owing to the best part of the meat having been carried away in the sweat during the thawing, it eats dry and tasteless and thus gets a bad name.

The new method of defrosting alters all this; it stops what is called the weeping, thus goodness is retained in the meat; the meat itself becomes easier to cook and when cooked retains both quality and flavour, while cooked and uncooked, presents a pleasing appearance.

The trade in the defrosted Australian meat at first met with poor results, but after being persevered with for a few weeks, sales increased to twelve to fifteen times the quantity of the first venture. Further, the traders found that it suited their customers, and now elect this defrosted in preference to the similar quality of chilled meat. But the depots for defrosting are limited and are practically used to their full powers, but owing to the opposition defrosted meat is meeting in various bodies it will require to have the defrosting process supported from influential quarters to supply sufficient encouragement to extend the machinery for defrosting. At present, frozen meat when cut into joints, loses a large proportion of weight and most of its goodness. When defrosted it still loses weight, rather less than half of meat not defrosted, but keeps all its goodness and flavour, so that quality for quality, defrosted meat is every whit equal to chilled meat in all respects.

The point of difference is that Australian is Empire meat and the money paid for it remains in England in the form of wages, &c., for manufactured goods, while the money paid for chilled meat goes to America, and leaves England for good and all. So that if Australian frozen meat can be made equal to chilled meat for table purposes—and it can be in defrosting—then it is all to the advantage of the Empire that its sale should receive the necessary encouragement from the powers that be, and remember there is no question of increased price; if defrosted meat came into its own what change of price there might be would be in favour of the purchaser.

Disinfectants in the Dairy—Limitations.

Discussing a recent survey of the conditions existing in butter factories in a North Coast district, an officer of the Biological Branch of the New South Wales Department of Agriculture points out that undue reliance is often placed on preparations which, although they are effective germicides and have a definite value in the factory and on the farm, are entirely unable to take the place of boiling water, and are in no way to be regarded as grease or casein removers. The following paragraphs from a dairying pamphlet of the Department show just what the effective cleaning of dairy utensils involves.

A Most Important Operation.—The cleaning of dairy utensils, if somewhat irksome, is not particularly difficult, the dairy farmer is reminded. From the point of view of cream quality, it is one of the most important operations on the farm, yet sometimes it does not receive the attention it warrants. This is due largely to the fact that the bacteriological aspect is not properly understood. Owing to our climatic conditions which are so suitable for bacterial growth, improperly washed dairy utensils result in a large amount of contamination of the cream supply, with a likelihood of inferior cream. The object of cleaning dairy utensils and separator parts is not only to remove the milk or cream adhering thereto but also to kill all bacterial growth thereon. The removing of the residue of milk or cream is not difficult, and is best done with the aid of proper brushes and warm water to which a small amount of washing-soda has been added. It is important that all particles of milk or cream should be removed. Rags should not be used in the wash-up.

The next procedure is to kill the bacteria adhering to the utensils. There are two common methods of killing bacteria—one is by the use of germicides or disinfectants, and the other is by the use of heat in form of boiling water or steam. Disinfectants cannot be safely used for treating dairy utensils except in special cases, and the boiling water treatment is the general method adopted. This is very effective when properly carried out.

Hot Water Supply.—The question of an effective boiling water supply on the farm has been rendered more difficult of late years on highly improved properties by reason of the shortage of wood. This has not yet reached an acute stage generally, and where it has steps can be taken to overcome it. Older dairying countries have had the same problem to face and have adopted modern water heaters—electric heaters (where cheap power has been available) and other methods. We have hardly reached that stage, but consideration might be given on certain farms to the installation of bricked-in coppers (where not already done) as an economical means of heating water and for cleansing dairy utensils. The ordinary chip bath heater is a convenient method of using up cobs, waste paper, &c., but care must be exercised to see that the water is heated sufficiently. To effectively treat the utensils, the water must be close to boiling point. Warm water is of very little value, and water which has been heated some distance from the dairy and is left to stand at the wash-up bench for five or ten minutes after being removed from the fire quickly cools off to well below boiling point.

The most effective method is to place the separator parts and the smaller dairy utensils, after properly washing, in the vessel used for heating water (be it a copper, kerosene tin, or whatever is used), while still on the fire, making sure that the water comes to the boil. After five minutes, remove utensils and hang up or stand in a clean atmosphere. They will dry thoroughly in a few minutes without resource to rags, and will be in perfect condition for the next milking. Set-in coppers are very useful for this purpose, and are not only economical as to the wood supply but are effective in wet weather.

Chief Cause of Inferior Cream.—It is safe to say that the small percentage of inferior cream now delivered to factories would be almost eliminated if the above methods of treating dairy utensils were carried out and attention given to a few other details. By far the greater portion of this small amount of inferior cream is brought about by the utensils not being properly cared for.

It is, of course, necessary to treat the utensils as outlined *twice daily—i.e., after each milking.* Where the milking has been carried out in such a way so as to reduce bacterial contamination to a minimum, and where the separator parts and other utensils have been correctly treated as suggested, other things being equal, the cream coming from the separator will be in a sound condition from a bacteriological point of view and will not be heavily contaminated. This being so, there is eevry likelihood of it remaining in a "choice" condition until it is delivered to the factory, though certain additional precautions may be take nto assure of this being done.—A. and P. Notes, N.S.W. Dept. of Agric.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

THE TEETHING DELUSION.

A delusion may be merely foolish, but harmless. Old superstitions that do no harm may be safely left to die of themselves, as knowledge grows. Certainly they die very slowly; but that is no reason why we should be impatient. But when a delusion causes an immense amount of suffering to small babies, when it is an important cause of much sickness and many deaths then it is our duty to expose it without mercy. We can hold no truce with baby-slaughter.

How often do we see babies suffering from loose motions due to over-feeding or unsuitable feeding, or half starved from insufficient food, or food they cannot digest, or feverish from some infection, whether a simple ''cold'' or something more serious, whose mothers comfort themselves with the silly belief that it is ''just his teeth''! It would almost seem that ''teething'' is the one cause of all the complaints from which babies may suffer! Surely this is a very absurd belief. It may be very comforting to the mother (for a time), but it is often very disastrous for the baby.

Let us Know the Truth.

Let us understand the exact truth. A baby's teeth do not come into existence when they come into sight. Baby's first tooth was not formed the night before the day you noticed it. All his first set of teeth were formed long before birth; he has a full set under his gums the day he was born. He cuts his teeth at intervals up to two years of age. Therefore all babies are teething from birth up to that age, and most babies are healthy all the time, if properly cared for. As for cutting his teeth, in most cases all that happens is that you look into his mouth, and there is a tooth visible, which the day before was covered by the gum.

Healthy Babies Cut their Teeth Easily.

Teething is never a cause of serious disease. Multitudes of little lives have been lost, because mothers have put their faith in ''teething,'' and their hope in the disappearance of disease with the appearance of teeth. Sound, healthy babies cut their teeth quite easily. They may want to bite things, and they may dribble. These are quite healthy symptoms, though they may be messy. Very rarely the baby may be fractious for a day or two, perhaps there may be some discomfort in his swollen gums, and there may be some want of appetite. If you then force or entice him to take more food than he really wants he may have loose motions, but that is your fault. Delicate nervous babies are more likely to have these symptoms, but frequently they have none of them. The symptoms never require anything more than a little common-sense management.

Common Ailments Caused by Mistakes.

Of course a baby may be seriously ill about the time he is cutting his teeth, but there is always a reason for it. The teething is just a coincidence. When a baby is seriously ill, his teeth trouble him very often. You can see that they are uncomfortable, perhaps even aching. This does not mean that his sickness is caused by his teeth, as is so often thought. It means that his sickness has caused the aching of his tooth. Cutting his teeth will not improve his sickness; but get rid of his sickness, and his teeth will be all right.

Nearly all the common ailments of babyhood are caused by mistakes in feeding or management or by some infection. Your first effort, when baby is upset, should be to find out the cause. Never put it down to "teething." If you are puzzled, seek advice from your doctor or the Baby Clinic. Do not listen to old bodies who tell you "it is nothing but his teeth."

KITCHEN GARDEN.

Onions which have been planted in seed beds may now be transplanted. The ground should long since have been thoroughly cleansed, pulverised, and should be rolled previous to transplanting. Onions may still be sown in the open on clean and well-prepared ground. In favourable weather plant out cabbages, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these as well as of peas, broad beans, kohl-rabi, radishes, spinach, turnips, parsnips, and carrots, and, where sufficiently large, thinned out. Dig and prepare beds for asparagus, using plenty of well-rotted farmyard manure.

FLOWER GARDEN.

Planting and transplanting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, penstemons, heliotrope, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia bulbs should be taken up and placed in a shady situation out of doors. Plant bulbs, such as anemones, ranunculus, snowflakes, freesias, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate, but hyacinths may be tried, although success is doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

MARKET GARDENING.

(*Continued*).

ROTATION.

Plants belonging to the same natural order should not be allowed to succeed each other on the same section of land. Some crops are a good preparation for others, as, for instance, onions after celery or carrots after beans.

Rotation assists in checking the devastations of insects and fungi to which a crop may be subject. Deep-rooted crops enrich the top soil for the benefit of shallow-rooted varieties which may follow.

Different crops require plant foods in varying proportions; hence a rotation is more economical of manure.

A definite system of rotation affords better opportunities for cleaning the ground.

Crops which occupy the ground for several years should be succeeded by others of shorter duration.

Rotations allow of a better distribution of labour during the year. Plants cultivated for their roots or bulbs should not be succeeded by others grown for a like purpose.

Rotations may extend from three to eight years, according to the size of the garden, the quality of the soil, the products required, the manures available, &c.

THE COMPOST HEAP.

Although composting is essential, it should be avoided as much as possible, for decomposition cannot be controlled without some loss of plant food. It also requires a large additional expenditure of labour in the extra handling.

In the management of compost heaps, the gardener should see that leaching and fire-fanging are controlled, and that the finest texture is secured. To accomplish these ends, it is customary to stack in rather compact, flat heaps not less than 4 ft. deep, and covering as much area as may be necessary. The heaps are so deep that there can be no leaching if they are built with perpendicular sides. They must be watered with a hose often, and freely enough to prevent fire-fanging. To improve the texture, the heaps are turned from one to three times at convenient intervals. About six months are required to secure the proper decomposition.

MANURES AND FERTILISERS.

The great advantages gained by using *improved methods of cultivation,* in combination with the *application of artificial fertilisers,* in order to increase the productiveness of the soil, are becoming gradually more recognised. It is quite self-evident that the best profits will result if small areas are made to produce heavy crops of high quality. This is achieved by *"intensive cultivation,"* as practised in other countries; but our farmers, on account of land being comparatively cheap, hardly realise what such cultivation means.

Even the richest of soil will gradually become impoverished by continuous cropping; the crops not only become lighter and of poorer quality, but are more susceptible to disease. The *plant foods* which are removed by the growing crops *must again be returned* to the soil in one form or another. With judicious application of artificial fertilisers, combined with thorough cultivation and, if possible, with rotation of crops, the fertility of the soil can not only be maintained, but is frequently considerably increased.

No artificial fertiliser will be of any value if it does not supply in *adequate proportion, all the necessary plant foods* required by the crops and what are wanting also in the soil. Excess of one plant food cannot make up for the absence or deficiency of another. In this respect, grave mistakes have frequently been made, and much money squandered in applying manures which only supply a part of the necessary plant foods and, perhaps, one which was not wanted at all. How often in practice have large amounts of bonemeal been applied to land, with a negligible result, because potash or nitrogen was wanting more than the phosphoric acid.

Artificial fertilisers will not be of *any value* to land unless it is in *good tilth,* is *well drained,* and contains a sufficient amount of *humus* and *moisture.*

Situation, class of soil, climatic conditions, and rainfall are determining factors in the selection of crops for certain districts.

The importance of *humus* in the soil is frequently quite overlooked by many farmers and fruitgrowers. Unfortunately, a large number of our soils are deficient in the amount of humus they contain, and the customary methods of cultivation and climatic conditions have a tendency to continually lower the amount. A reduction of the humus content of a soil lowers its capacity to absorb and retain moisture and adversely alters its mechanical condition.

The amount of humus may be increased by the addition of bulky amounts of vegetable matter, dead leaves, straw, cornstalks, and more particularly by *stable manure.* Small amounts of stable manure, used in addition to artificial fertilisers, have a very beneficial action, and increase the value of the artificial fertiliser, by increasing bacterial activity in the soil.

Stable manure is, however, generally very scarce, and the most economical way to supply to the soil the necessary humus, is by the practice of growing and ploughing in of *green manure crops.* As a rule, vigorous-growing leguminous crops—like cowpeas, field peas, manuritius beans, &c.—are to be preferred; but excellent results are frequently obtained with rape and mustard. The crop has to be chosen according to locality and season.

By growing crops in a *proper rotation,* and applying the manures required for each crop, soil fertility will be maintained.

In many soils the want of *lime* is apparent, and is frequently shown by strong *acid reaction of soil* and subsoil. Many plants are very susceptible to soil acidity; and application of artificial fertilisers, and more particularly such with an acid reaction, is frequently an absolute waste of money, unless the acidity is corrected by a previous application of lime in one form or another. Only in the case of heavy, clayey soils the use of *quick lime* or *air-slaked lime* is to be recommended; for lighter soils *carbonate of lime,* in the form of limestone screenings, or pulverised limestone, and also *sulphate of lime* or gypsum, are to be preferred, and all have to be applied as a topdressing. Particularly after ploughing in heavy crops of green manure, many soils develop a high acidity, and may require liming.

As a rule, soils under cultivation for some years will require *complete fertilisers,* which contain sufficient amounts of nitrogen, potash, and phosphoric acid, in order to obtain good crops and maintain the fertility of the soil.

The plant foods which are generally supplied by artificial fertilisers are:—

Nitrogen, Potash, and *Phosphoric Acid;* and, as they may be used in various forms, a few remarks on these points are necessary. It must be also borne in mind that the plants can only absorb, by the aid of the roots, such *mineral plant foods* which are actually in solution; and, therefore, *sufficient moisture* must be present in the soil, and the plant foods in the manure should be in a fairly *soluble form.* It is always best to use artificial fertilisers in the most concentrated form, in order to save freight and handling. The *composition* of all *artificial fertilisers* on the market is published from time to time in the *Queensland Agricultural Journal.*

Nitrogen is one of the most important and, at the same time, most expensive ingredients of artificial fertilisers.

Nitrogen promotes and stimulates the growth of leaves and stem, but rather retards, on account of a more luxuriant growth, the development of buds and flowers. The leaves generally show a deep-green colour, and the whole plant becomes more vigorous after application of a nitrogenous manure. In the form of *nitrates* it is most active and most readily available to plant life, and is generally applied in the form of *nitrate of soda,* or *Chili saltpetre,* which contains from 15½ to 16 per cent. of nitrogen. Saltpetre is, however, very soluble and, unless directly used up by the plant, may be readily leached out and lost in the drainage water. At the present day it is being replaced by the artificial product *nitrate of lime,* which is just as active and available, but not so easily leached out, and has a much better action on the soil on account of the large amount of lime it contains. Both fertilisers, and more particularly the nitrate of lime, absorb moisture from the air, are not suitable to mix with other fertilisers, and are also bad to handle. They are generally applied as top-dressings in repeated small amounts at the time when the crop is ready to utilise them.

Dried blood contains from 12 to 13 per cent. of nitrogen in a fairly available form, and many crops seem to benefit particularly by this nitrogenous manure, which, however, is rather scarce and not easily obtainable. Blood may be mixed with other fertilisers, and can be applied some time before planting.

Sulphate of ammonia contains about 20½ per cent. of nitrogen in a very soluble form, which, although being so soluble, is not easily leached from the soil, and becomes gradually changed into the active form of nitrate by the action of bacteria. It can be mixed with other artificial fertilisers, except those which contain free lime.

Other sources of nitrogen are fish manure, cotton-seed meal, oil cakes, meatworks manure, &c.

An *excessive application* of nitrogenous manure may act sometimes in a detrimental manner by producing a too luxuriant growth of foliage and tops, and reducing the yield of grain, fruit, or tubers. Such bad effects are counteracted by the addition of fertilisers containing potash and phosphoric acid.

Potash is an important constituent of all plants, and is found most abundantly in the young leaves and twigs, as it is intimately connected with the production of starch and sugar in the leaves and the subsequent transference of these bodies to fruit, tubers, &c.

Many of our soils are rather deficient in potash, and the mineral plant food is, therefore, of particular importance to farmers.

Sulphate of potash, or potassium sulphate, is the most concentrated form in which potassium is used as a fertiliser, as the salt contains about 50 per cent. of potash, in a very soluble and readily available form. This salt is easily handled, and can be mixed with all fertilisers, and can be applied at any time.

In the case of a few crops, for instance for bananas and potatoes, other commercial forms of potash manure—viz., *muriate of potash,* which contains from 50 to 60 per cent. of potash, and kainit, which contains an average of 12½ per cent. of potash—can be used with advantage instead of sulphate of potash.

Wood ashes—particularly the ash of lantana, tobacco leaves and stalks, coffee berry pulp—contain a fairly large amount of potash. The ashes of our native timbers contain as a rule only small amounts of potash.

Phosphoric acid is the third important constituent of artificial fertilisers, and found therein in the form of its salts, called *phosphates.* Phosphoric acid appears necessary to the general nutrition of all plants, and hastens their maturity. No plant could produce seeds without a sufficient supply of phosphoric acid. It also aids in the assimilation of other compounds, and aids in the production and transport of the nitrogenous compounds in plant cells.

Practically the majority of our soils are deficient in phosphoric acid, and more particularly the red volcanic soils are deficient in the readily available soluble form of phosphates, although the total amount present may be fairly high.

Phosphoric acid in the form of *Phosphate of Lime* is the principal constituent of the bones and teeth of animals; and bones, in one form or another, therefore, form the chief supply of phosphoric acid in artificial fertilisers.

Superphosphates, obtained by treating either bones phosphates or mineral phosphates with strong sulphuric acid, contain from 17 to 19 per cent. of water soluble phosphoric acid, and in a special form of concentrated superphosphates up to 40 per cent.

When applied to the soil, the water soluble form of phosphoric acid will gradually change into a less soluble form, and this change is fairly rapid in our red soils rich in iron.

For soils inclined to be acid, superphosphates are not so suitable, and the phosphoric acid is generally supplied in form of *basic slag,* or *Thomas's phosphate,* which contains the phosphoric acid in a form insoluble in water, but readily soluble in weak organic acids like citric acid.

Thomas's phosphate is at the present day being replaced by the artificial fertiliser *basic superphosphate,* which contains about 18 per cent. of citrate soluble phosphoric acid, and is therefore an excellent substitute for superphosphates in soils where the superphosphate would change into soluble phosphates.

For most of our crops, and particularly those grown on red volcanic soil, the use of *crushed rock phosphate,* like Holbourne Island phosphate, will be found very suitable, supplying not only phosphoric acid in citrate soluble form, but also lime.

Bonemeal, or *bonedust,* contains from 20 to 25 per cent. of phosphoric acid in form of lime phosphate insoluble in water or weak acids, which, therefore, becomes available very slowly. Bonemeal generally contains from 3 to 5 per cent. of nitrogen, which makes this manure more valuable.

When studying the *requirements of fertilisers* of any crop, the nature of the soil has to be taken carefully into account. There may be a sufficiency of total plant foods, as disclosed by the ordinary agricultural chemical analysis of the soil, but they may be in a *very unavailable* form. Again, small quantities of plant foods, which may be quite sufficient for the crop in a light, friable, sandy soil which promotes a prolific root growth, may be quite insufficient in a heavy, clayey soil.

As a general rule, it is much better to divide the total amount of fertiliser necessary for the crop into *two* or *more dressings* during the growth of the crop.

Most *farm crops* and particularly *vegetables,* which are, as a rule, gross feeders, will benefit by two or more dressings of artificial fertilisers.

For the application of artificial fertilisers calm and cool days should be selected, and the application made, if possible, just before or after rain.

Heavy applications of chemical manures should never come into direct contact with the roots of plants, but *should be well mixed with the soil.*

TABLE OF EQUIVALENT QUANTITIES OF MANURES.

Per Acre.	Approximate Quantity per Perch.	Approximate Quantity per Square Yard.	Per Acre.	Approximate Quantity per Perch.	Approximate Quantity per Square Yard.
1 ton ..	14 lb.	7½ oz.	2 cwt. ..	1¼ lb.	..
10 cwt. ..	7 lb.	3¾ oz.	112 lb.—1 cwt.	11¼ oz.	..
5 cwt. ..	3½ lb.	1¾ oz.	84 lb. ..	8½ oz.	..
4 cwt. ..	2¾ lb.	..	56 lb. ..	5½ oz.	..
3 cwt. ..	2 lb.	..	28 lb.	3 oz.	..

1 Teaspoonful = about ½ oz.

Farm Notes for May.

FIELD.—May is usually a busy month with the farmer—more particularly the wheatgrower with whom the final preparation of his land prior to sowing is the one important operation. Late maturing varieties should be in the ground by the middle of the month at the latest.

Clover land, intended primarily for feeding off, should be sown not later than the end of April.

The necessity of pickling all wheat intended for sowing purposes is again emphasised; and for general purposes, combined with economy in cost of material, the bluestone and lime solution holds its own. To those who desire an easier but somewhat more costly method of treatment, carbonate of copper at the rate of 1 oz. to the bushel and used in a dry form is suggested.

Potatoes, which in many districts are still somewhat backward, should have by this time received their final cultivation and hilling-up.

The sowing of prairie grass on scrub areas may be continued, but should be finished this month. This is an excellent winter grass, and does well in many parts of Southern Queensland.

Root crops, sowings of which were made during April, should now receive special attention in the matter of thinning out and keeping the soil surface well tilled to prevent undue evaporation of moisture.

Every effort should be made to secure sufficient supplies of fodder for stock during the winter, conserved either in the form of silage or hay.

Cotton crops are now fast approaching the final stages of harvesting. All consignments to the ginnery should be legibly branded with the owner's initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

Orchard Notes for May.

THE COASTAL DISTRICTS.

In these notes for the past two months the attention of citrus-growers has been called to the extreme importance of their taking every possible care in gathering, handling, packing, and marketing, as the heavy losses that frequently occur in Southern shipments can only be prevented by so treating the fruit that it is not bruised or otherwise injured. It has been pointed out that no citrus fruit in which the skin is perfect and free from injury of any kind can become speckled or blue-mouldy, as the fungus causing the trouble cannot obtain an entry into any fruit in which the skin is intact. Growers are, therefore, again warned of the risk they run by sending blemished fruit South, and are urged to exercise the greatest care in the handling of their fruit. No sounder advice has been given in these notes than that dealing with the gathering, handling, grading, packing, and marketing, not only of citrus, but of all other classes of fruit.

It is equally important to know how to dispose of fruit to the best advantage as it is to know how to grow it. To say the least, it is very bad business to go to the expense of planting and caring for an orchard until it becomes productive and then neglect to take the necessary care in the marketing of the resultant crop. Main crop lemons should be cut and cured now, instead of being allowed to remain on the tree to develop thick skins and coarseness. As soon as the fruit shows the first signs of colour or is large enough to cure down to about from 2¼ to 2½ in. in diameter, it should be picked, care being taken to handle it very gently, as the secret of successfully curing and keeping this fruit is to see that the skin is not injured in the slightest, as even very slight injuries induce decay or specking. All citrus fruits must be sweated for at least seven days before being sent to the Southern States, as this permits of the majority of specky or fly-infested fruits being rejected. Citrus trees may be planted during this month, provided the land has been properly prepared and is in a fit state to receive them; if not, it is better to delay the planting till the land is right.

In planting, always see that the ground immediately below the base of the tree is well broken up, so that the main roots can penetrate deeply into the soil and not run on the surface. If this is done and the trees are planted so that the roots are given a downward tendency, and all roots tending to grow on or near the surface are removed, the tree will have a much better hold of the soil and, owing to the absence of purely surface roots, the land can be kept well and deeply cultivated, and be thus able to retain an adequate supply of moisture in dry periods. Do not forget to prune well back when planting, or to cut away all broken roots.

All orchards, pineapple and banana plantations should be kept clean and free from all weed growth, and the soil should be well worked so as to retain moisture.

Custard apples will be coming forward in quantity, and the greatest care should be taken to see that they are properly graded and packed for the Southern markets, only one layer of one sized fruit being packed in the special cases provided for this fruit—cases which permit of the packing of fruit ranging from 4 to 6 in. diameter in a single layer.

Slowly acting manures—such as meatworks manure—may be applied to orchards and vineyards during the month; and lime can be applied where necessary. Land intended for planting with pineapples or bananas during the coming spring can be got ready now, as, in the case of pineapples, it is a good plan to allow the land to lie fallow and sweeten for some time before planting; and, in the case of bananas, scrub fallen now gets a good chance of drying thoroughly before it is fired in spring, a good burn being thus secured.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Clean up all orchards and vineyards, destroy all weeds and rubbish likely to harbour fruit pests of any kind, and keep the surface of the soil well stirred, so as to give birds and predaceous insects every chance to destroy any fruit fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Further, it is a good plan to clean up the land before pruning takes place as, if delayed till the pruning has been finished, the land is apt to dry out in a droughty season.

Pruning can be started on such varieties as have shed their leaves towards the end of the month, as it is a good plan to get this work through as early in the season as possible, instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—*not vines*, as the later vines are pruned in the season, the better in the Granite Belt district, as late-pruned vines stand a better chance to escape injury by late spring frosts.

All worthless, badly diseased, or worn-out trees that are no longer profitable, and which are not worth working over, should be taken out now and burnt, as they are only a menace and a harbour for pests.

Land intended for planting should be got ready as soon as possible, as, if ploughed up roughly and allowed to remain exposed to the winter frosts, it will become sweetened and the trees planted in it will come away much better than if set out in raw land. In any case the land must be properly prepared, for once the trees are planted it is a difficult matter to get the whole of the land as well worked as is possible prior to planting.

Slowly acting manure—such as ground island phosphates or basic phosphates—may be applied to orchards and vineyards. They are not easily washed out of the soil, and will become slowly available and thus ready for use of the trees or vines during their spring growth. Lime may also be applied where necessary.

This is a good time to attend to any drains—surface, cut-off, or underground. The two former should be cleaned out, and in the case of the latter all outlets should be examined to see that they are quite clear and that there is a good getaway for the drainage water. New drains may also be put in where required.

In the warmer parts citrus fruits will be ready for marketing, and lemons ready for cutting and curing. The same advice that has been given with respect to coast-grown fruit applies equally to that grown inland; and growers will find that careful handling of the fruit will pay them well. Lemons grown inland are, as a rule, of superior quality to those grown on the coast, but are apt to become too large if left too long on the trees, so it is advisable to cut and cure them as soon as they are ready. If this is done and they are properly handled, they may be kept for months, and will be equal to any that are imported.

If the weather is very dry, citrus trees may require an irrigation, but, unless the trees are showing signs of distress, it is better to depend on the cultivation of the soil to retain the necessary moisture, as the application of water now is apt to cause the fruit to become soft and puffy, so that it will not keep or carry well.

Land intended for new orchards should be got ready at once, as it is advisable to plant fairly early in the season in order that the trees may become established before the weather again becomes hot and dry. If the ground is dry at the time of planting, set the trees in the usual manner and cover the roots with a little soil; then give them a good soaking; and, when the water has soaked into the soil, fill the hole with dry soil. This is much better than surface watering.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

					MOONRISE.	
	April, 1930.		May, 1930.		April, 1930.	May, 1930.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.5	5.46	6.21	5.17	a.m. 7.34	a.m. 8.33
2	6.5	5 45	6 21	5.17	8.33	9.36
3	6.6	5.44	6 22	5.16	9.38	10.40
4	6 6	5.43	6.22	5 16	10.41	11.41
5	6 7	5.42	6.23	5.15	11.45	p.m. 12.35
6	6.7	5.41	6.23	5.14	p.m. 12.47	1.21
7	6.8	5.40	6.24	5.14	1.45	1.57
8	6.8	5.39	6.25	5.13	2.37	2.32
9	6 9	5.38	6.25	5.13	3 21	3.6
10	6.10	5.37	6 26	5.12	3 58	3.38
11	6 10	5 36	6 27	5.11	4.43	4 10
12	6 11	5.34	6.27	5.11	5.7	4.45
13	6.11	5.33	6.28	5.10	5 39	5.23
14	6.12	5 32	6.28	5.10	6.14	6.9
15	6.12	5.31	6 29	5.9	6.50	6.58
16	6.13	5.30	6.30	5.8	7.30	7.50
17	6.13	5.29	6 30	5.8	8.17	8.44
18	6.14	5.28	6 31	5.7	9.7	9.39
19	6.14	5.27	6 31	5.7	9.59	10.35
20	6.15	5.26	6.32	5.6	10.56	11.31
21	6.15	5.26	6.33	5.6	11.51	...
22	6.16	5.25	6.33	5.5	...	a.m. 12.11
23	6 16	5.24	6.34	5.5	a.m. 12.45	1.18
24	6.17	5.23	6.35	5.4	1.39	2.12
25	6.17	5.22	6.35	5.4	2.34	3.8
26	6.18	5.21	6.36	5.3	3.29	4.6
27	6.18	5.21	6.36	5.3	4.25	5.8
28	6.19	5.20	6.37	5.2	5.23	6.16
29	6.19	5.19	6.38	5.2	6.23	7 22
30	6.20	5.18	6.38	5.1	7.26	8.29
31	...	...	6.39	5.1	...	9.32

Phases of the Moon, Occultations, &c.

6 April	☾	First Quarter	9 24 p.m.
13 ,,	○	Full Moon	3 48 p.m.
21 ,,	☽	Last Quarter	8 8 a.m.
29 ,,	●	New Moon	5 8 a.m.

Perigee, 9th April, at 9.12 p.m.
Apogee, 21st April, at 10·54 p.m.

On the 9th at 10 p.m. Neptune will be 4 degrees south of the Moon, but will be much more difficult to see than Jupiter.

On 13th April at 4 o'clock in the afternoon the Moon will be undergoing a partial eclipse in the shadow of the Earth, when far below our horizon in Queensland. A fortnight later an extraordinary eclipse of the Sun will take place which will also be invisible in Queensland. It will be seen as a total eclipse at San Francisco and across Southern Canada.

The conjunction of Saturn and the Moon on the 19th will take place when both are far below the horizon.

Mercury and Venus will be technically in conjunction on the 22nd, but not favourably situated for observation.

The Moon will be passing from the west to the east of Mars on the 25th at 7 a.m. when invisible.

Mercury will reach its greatest distance, 20 degrees east of the Sun, on the 27th, it will then be at a sufficient height above the western horizon at sunset to afford opportunities for seeing it somewhat later; Venus, however, will be higher up and brighter.

The Southern Cross will be at its greatest height and on the Meridian at Warwick half an hour after midnight on 21st March. It will then be at a height of 58 degrees above the southern horizon (at Warwick). On the 1st April it will reach this position 40 minutes earlier. Four minutes must be added for each degree west of Warwick, or subtracted for Brisbane or any other place on the same Meridian, 153 degrees east of Greenwich. Subtract four minutes for each day after the 21st of March.

6 May	☾	First Quarter	2 53 a.m.
13 ,,	○	Full Moon	3 29 a.m.
21 ,,	☽	Last Quarter	2 21 a.m.
28 ,,	●	New Moon	3 36 p.m.

Perigee, 5th May, at 4.48 a.m.
Apogee, 19th May, at 5.54 p.m.
Perigee, 31st May, at 3.36 p.m.

At 4 o'clock in the morning of the 7th the Moon will be passing Neptune, four degrees away on its northern side.

On the 12th Mars will be passing from west to east of Uranus, at apparently the distance of only one diameter of the Moon. A telescope or binoculars will be necessary to see the larger and much more distant planet Uranus. They will be well above the eastern horizon about an hour before sunrise.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

Anzac.

THE fifteenth anniversary of the Epic of Gallipoli, 25th April, was commemorated fitly, amply, and reverently throughout the Commonwealth; and also in those far countries where, with their comrades of New Zealand, Great Britain, and other parts of the Empire, the Australian volunteer soldier won lasting fame. The spirit of that great day was expressed in an inspiring message from Sir John Monash, the Australian Corps Commander, in the course of which he said:—

> Engraved in the heart of every true Australian is the memory of those brave men who, on far-off fields of battle, put the seal on Australia's honour and nationhood with their lives.
>
> With a common impulse, therefore, the people, as a nation, pause each year to pay their tribute of remembrance, and to commemorate, in a spirit of love and gratitude, the heroism and sacrifice of those who did not return. Each year finds this sentiment perhaps deeper and more abiding, because time, which proves all things, confirms the debt we owe to those who fought so valiantly and died so nobly in their country's cause.
>
> Deep as may be the sorrow, there is also the feeling of pride that on Anzac Day fifteen years ago Australians faced their grim baptism of fire, in one of the most hazardous adventures in history, with a dash and daring and abandon of courage that earned them enduring fame against the background of years.
>
> The message of Anzac Day stands out in shining letters. It is courage and fortitude. To-day, when the problems of peace, some of them the aftermath of the war, press so heavily on us as a people, it should be our inspiration. Not only should we follow the precept, but also the example set by our soldiers, who never wavered, but always did their best in a weary war of attrition and endurance. They ended as they started, never thinking of defeat, but only the objective to be won.

The Australian Spirit.

THE spirit of Anzac existed before Gallipoli, but first found adequate expression there. It still existed as the spirit of Australia at all times, through prosperity and stress, through drought, fire, and flood, inspiring the nation with the eternal hope of better things. Those ideas formed the keynote of a fine address by Colonel F. M. de F. Lorenzo, before an Anzac Day audience. The spirit of a nation, he said, was formed usually by centuries of trial, and became the soul of its traditions and an integral part of the life of the people. The spirit of Anzac was not merely the spirit which actuated the troops at Gallipoli to do the seemingly impossible, but a spirit which had existed before the name Anzac was coined. Before Australians achieved feats unprecedented in the history of war the spirit of Anzac had turned impenetrable forest and scrub into farms and deserts into crop lands. It was born in the pioneers, fighting against nature in fire, flood, and drought. Men were ruined in single seasons or single nights, and came up smiling, prepared to "scrap" once more with the almost impregnable forces of nature.

Notwithstanding this record of heroism Australians had not until recent years any really national traditions. Their forefathers had brought with them the traditions of the homeland, and these were accepted because their sons had none of their own. Australia had assisted in various small military campaigns and sent troops to aid Empire causes, but there was no real call for help until 1914. Then 30,000 Australian men of all occupations, professional men and labourers, squatters and shearers, for physique, brains, and initiative unparalleled in the world, embarked for a destination and adventures unknown. They were a magnificent body of men, but still were not the fighting unit they were to become—the pride of the world.

In Egypt, away from their own people and among half a dozen languages, the barriers of State units were broken down, and they became an Australian community, finding their nationality. Though there was no doubt as to the individual bravery of the men, demonstrated in brushes with the military police and in daily climbing of unclimbable pyramids, the question arose as to whether or not they could stand the hell of war. At Gallipoli they achieved the impossible in war by landing, and again by staying until they left of their own accord.

The gibes of lack of discipline among the Australian troops could be hurled back in the faces of those who uttered them. The discipline of Gallipoli was peculiar and exacting. Without marvellous discipline the Gallipoli landing, occupation, and evacuation never could have been achieved.

It was essential that one spirit should actuate all the troops in that campaign, and the spirit of Anzac, which had existed before in Australians without a name, there found its outlet. If all the meritorious deeds of the campaign received their full recognition hardly a man on Gallipoli would have been without some military honour. So common were they that innumerable heroic deeds received no recognition. He had seen a shell land in an ammunition dump. The crew of three were all injured, and the dump caught fire. Two infantrymen rushed over to put the fire out before the dump exploded, and rescued the three injured men. The incident was reported, and only one military medal was allowed as its recognition.

In France the same spirit actuated all other Australian troops. They fought beside the flower of the British Army and against the flower of the Germans, and at no time did the efficiency and fighting prowess of either cause any quickening of their pulse. If they knew they were against the Prussian Guards, they were "on their toes for the fight, and they beat them every time they touched them."

The same spirit, the speaker ended, animated Australia at all times, through all depression and difficulties as well as in prosperity. It was the strength and glory of the nation.

Soil Problems.

THE third annual report of the Council for Scientific and Industrial Research which has just come to hand is a very interesting document. It gives an excellent idea of the scope and value of the investigations of the Council. Regarding soil problems, for instance, we learn that in 1927 the Council entered into a co-operative agreement with the University of Adelaide for investigations to be carried out at the Waite Agricultural Research Institute on soil problems, particularly in the Murray River Valley Irrigation Settlements. The investigations were placed under the control of Professor J. A. Prescott, who was appointed as adviser to the Council on soil problems. This action was taken as a result of the realisation of the importance of greater co-ordination in the investigation of soil problems throughout the Commonwealth.

The development of laboratory technique and the application of modern methods to Australian problems had already become part of the policy of the Department of Agricultural Chemistry of the Waite Institute when action was taken by the Council in 1927 for the study of soil problems in co-operation with that institute. The development of internationally recognised methods under the auspices of the International Society of Soil Science and the creation of the Imperial Bureau of Soil Science have made the present time singularly opportune for securing co-ordination throughout the Commonwealth.

Before similar co-ordination is possible on the field side, much investigation remains to be done, but the work already carried out in the irrigation settlements has enabled a field technique to be developed on a satisfactory basis and will lead the way for similar detailed work in other parts of Australia.

As part of the soil survey work, an aerial photographic survey of the whole of the Renmark Settlement has been carried out by officers of the Royal Australian Air Force with a view to ascertaining whether the known differences of soil types can be identified in the photographs. If so, it is intended to make use of the information thus obtained in completing the survey of the Renmark Settlement.

Possibilities of co-ordination in broader aspects of soil survey work in Queensland have also been explored, but no definite steps have yet been taken.

Tuberculous Milk and Pigs—An Interesting Test.

FOLLOWING on instructions issued by the Minister of Agriculture and Stock, Mr. Walker, the Government Bacteriologist, Mr. C. J. Pound, conducted at the Stock Experiment Station, Yeerongpilly, recently certain experiments with the feeding of tuberculous milk to young pigs.

Six young pigs were obtained and were subjected to the tuberculin test. All of them gave negative results. Three of these pigs were then fed on untreated milk from a known tuberculin cow, while the other three pigs were fed on pasteurised milk from the same cow. Subsequently, the whole six pigs were sent to a bacon factory and slaughtered in the presence of the manager, two meat inspectors, and Mr. Pound. The three pigs fed on the untreated milk all showed tubercular lesions (generalised), while the three pigs fed on pasteurised milk proved perfectly healthy.

Concurrently, Mr. Pound made certain investigations into the matter of the resistance of tubercle bacilli in bacon to the curing process, salting, and smoking. The salting and pickling of meat is generally accredited with great efficacy, but a closer examination reveals that an essential part of the bacon-curing process is the withdrawal of water from the meat, so that any micro-organisms that may be present in, or subsequently conveyed to the flesh, are only prevented from reproduction. Consequently the germs, especially those of a resistent nature like tubercle bacilli, cannot be completely destroyed by these processes.

Freytag has proved that the influence of a concentrated solution of common salt is resisted by tubercle bacilli for three months.

In the Yeerongpilly experiments, which are still in progress, we have so far proved that tubercle bacilli in the lymphatic glands of a pig kept in freshly prepared curing brine retain their vitality and virulence for forty-eight days—i.e., portion of salted tuberculous glands injected into guinea pigs produced tuberculosis.

Smoking dries the surface and impregnates the bacon with traces of acetic acid, formaldehyde, and creosote. Although the two former volatilise from the food, the surface retains some of the creosote. Smoking has only a surface preservative action, and does not reach the interior, so that pathogenic organisms like the tubercle bacilli, which may be present in the lymphatic glands, remain undestroyed and for some considerable time retain their virulence.

I. Forster found that the flesh of a pig affected with tuberculosis contained tubercle bacilli in a state of undiminished vigour after immersion for a month in brine, followed by careful smoking for fourteen days.

Tuberculosis material from pigs condemned for tuberculosis was subjected to the ordinary routine curing process of salting and smoking, the time occupied in the process being approximately seven weeks.

Fifteen days after the completion of the curing process a microscopical examination of these specimens revealed the presence of tubercle bacilli, and the vitality and virulence of these organisms was not noticeably affected by the curing process, for guinea pigs inoculated with this material developed tuberculosis.

It is to be remembered that the Yeerongpilly tests are not necessarily conclusive, and the foregoing is primarily in the nature of a progress report. Experiments are still in progress to ascertain the maximum period that tubercle bacilli will retain their vitality in cured tuberculous bacon.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director of Sugar Experiment Stations.

PART V.

(b) Review of the Industry since Federation.

(Continued.)

THE question of the best means of carrying on the sugar industry in Queensland and New South Wales by white labour early engaged the attention of the first Commonwealth Parliament, and much thought was devoted to the method. The first thing to be done was to carry out the wishes of Australia generally that the Pacific Island labour should be discontinued. The idea of carrying on the sugar industry by white labour only was at that time in the nature of a huge experiment, and there were plenty of people shouting that it would fail, that no country in the world had ever attempted to grow cane by white labour and no country could. They visaged the complete ruin of the cane sugar industry in Australia, as the result.

The first Act passed by the Commonwealth Government in relation to the sugar industry (and it may be pointed out that there were thirteen Acts from 1901 to 1912) was an Act to provide for the regulation, restriction, and prohibition of labour from the Pacific Islands. It was enacted that no Pacific Island labourer should enter Australia after the 31st March, 1904, and that none should enter before 1904 without a license. During 1902, the entries were to be restricted to not more than three-quarters of the number who returned to their native islands in 1901, and during 1903 to not more than one-half of those who had so returned during 1902. No agreement for island labour was to be made or remain in force after the end of 1906. If any Pacific Islanders were found after the end of 1906 they were to be deported. An amendment to this Act was later passed, which provided that certain Pacific Islanders, such as those that had entered Australia prior to September 1879, or were of extreme age, were married, or who were in possession of freehold land, or those whose lives might be imperilled on landing on the islands, &c., could be granted certificates exempting them from deportation.

The methods for encouraging the canegrowers to employ only white labour were by means of conditions set out in the *Excise Tariff Act of* 1902. An excise of 3s. per cwt. or £3 per ton on manufactured sugar was imposed up till 1st January, 1907, less from the 1st July, 1902, a rebate of 4s. or £2 per ton on all sugar-cane delivered for manufacture in the production of which white labour only had been employed after the 28th February, 1902. The rebate was calculated on cane giving 10 per cent. of sugar, and was equivalent to £2 per ton of sugar. This rebate was to be increased or reduced according to any variation from the standard, and all rebate was to be allowed at the time of delivery of the cane.

While the amount of excise on sugar remained the same, the rebate was abolished in July, 1903, by an Act to provide for a bounty on sugar, which provided for a payment out of consolidated revenue to every grower of sugar-cane in the production of which only white labour had been employed after the 28th February, 1903 (or for a period of twelve months immediately preceding the delivery thereof), on all cane delivered for manufacture. The rate of the bounty was 4s. per ton of cane calculated as in the previous Act—viz., on cane giving 10 per cent. of sugar, and to be increased or reduced according to variation from standard. The regulations to this Act set out that the average sugar-giving contents of cane produced in each district and the consequent rates of bounty per ton of cane should be deemed to be according to the scale below for the year commencing 1st June, 1903, and for every subsequent year till altered:—

Name of District.	Average number of tons of cane to make one ton of sugar.	Average sugar-giving contents of cane.	Rate of Bounty per ton of cane.
		Per cent.	s. d.
No. 1 District	8·0	12·5	5 0
No. 2 District	8·57	11·66	4 8
No. 3 District	9·22	10·84	4 4
No. 4 District	10·0	10·00	4 0

No. 1 District embraced all that portion of Queensland north of the 19th degree of south latitude—viz., from the Herbert to Mossman.

No. 2 District.—Between 19th and 23rd degrees south latitude, embracing from Townsville to Mackay.

No. 3 District.—Between 23rd and 26th degrees south latitude, from Yeppoon to Tiaro, taking in Bundaberg, Childers, Maryborough, &c.

No. 4 District.—Between 26th degree of south latitude and the border of New South Wales, taking in Gympie, Moreton, Logan, and Albert, &c.

In 1905, in view of the fact that the Act providing for the payment of bounty on sugar was to expire in 1907, proposals were made relating to an extension of same. The then Minister of Trade and Customs for the Commonwealth (Sir William Lyne) made inquiries in connection with further expediting and maturing Federal legislation relating to the placing of the sugar industry of Australia upon a basis of exclusive white labour production. Dr. Maxwell, then Director of Sugar Experiment Stations in Queensland, was asked to reply to certain questions.

The first question was—For what further period does it appear necessary to extend the system of paying bonus on white-grown cane? In his reply to this the Director stated that three years had elapsed since the introduction of the Commonwealth legislation. The total number of canegrowers in Queensland in 1905 was estimated to be 3,422, and the number of white growers out of this total was 2,681, or 78 per cent. of the whole. Although the number of farmers producing cane grown by white labour had largely increased, yet the figures did not necessarily convey a correct indication of the actual progress that white cane production had made to date, as the crop of 1904 was comprised as under:—

1. Black-grown cane, 947,105 tons, or 71·38 per cent.
2. White-grown cane, 379,884 tons, or 28·62 per cent.

These figures showed that at the end of the third year's operations less than one-third of the sugar production in Queensland was eligible for the bonus, although it was anticipated that the 1905 crop would show a slight increase of over a third.

The increase in the number of white growers had been mainly in the Southern and Central districts, and up to that time only small relative progress had been made in the tropical North. The Central and Southern districts were those of the closest settlement and of the more temperate climatic conditions. The earliest registrations for white-grown cane included farmers on the smallest areas. During the following two years, growers upon somewhat larger areas were able to enter upon conditions of white production. The remaining black-grown sugar areas were in the hands of some 750 large growers in the Northern districts, and by plantation owners in the Southern, or district of Bundaberg.

As to what further period it would be necessary to extend the payment of bonus, it was thought that a period of less than five years would not furnish security to nor induce owners or occupants of the larger areas to undertake the changes in expenditures, such as cutting up their estates and putting up buildings for settlers, that would attach to a conversion from black to white production. An extension for a period of seven years could claim the largest measure of support, providing the greatest security and advantage to all interests concerned.

The second question put was—Should the bonus continue to be paid in its present amount, or are there reasons for a revision? The reply to this was that, as the cost of labour had gone up since 1902, and with the progress of white production white labour would continue to command a higher compensation in the form of wages and better domestic provisions, the existing measure of bonus must, therefore, tend to fall below and not to exceed the cost of substituting white for coloured labour.

In reply to Question 3—Should a reducing scale be adopted with a view to the gradual diminution and extension of the bonus? The reply was that the measure of achievement had not yet been reached that would render the adoption of a reducing scale applicable to the situation at this time. To enforce its adoption prematurely can undo the present success and threaten the future promise that waits upon the experiment.

Question 4—Are there any reasons for a revision of the present rate of import duty? Reply—The measure of protection afforded to the home industry should be that amount which is indispensable to maintain same using the most modern means of producing against the foreign producers. If the measure of protection is raised to enable the home producer to continue to compete by the use of obsolete methods, a tribute is offered to ignorance and stagnation, with no gain to such home producer but at an unwarranted additional cost to the consumer. The present rate of import duty is £6 per ton as compared with the duty of approximately £9 per ton upon foreign sugars entering the United States of America, in which country no excise upon home-grown sugars exists. The present duty, although low, when compared with rates of duty operating in some other countries, appears to be adequate for its purpose.

Question 5—What are the foreseen effects of an increase of the excise duty? Reply—If an increase in the excise with a corresponding increase of bonus is made, it is likely to induce or force an immediate substitution of white for coloured labour in those districts where the natural and economic conditions allow at once of the change.

In concluding his remarks, Dr. Maxwell said:—

> "The undertaking of substituting white for coloured labour and of placing a tropical industry upon a basis of white production constitutes a *great experiment*. The experiment and its execution traverses natural and economic conditions that have to be consulted at every step. So far as the persons engaged in the industry are a factor, if they cannot be induced to aid the experiments by giving it a full and unbiassed trial, means may be proposed to secure their co-operation by pressure. The paramount demand of the experiment is that it shall succeed, and this requires that the fullest details of its nature, of its mode of operation, and of its ultimate probable effects shall be understood; and with these, the greatest patience, discrimination, and care in carrying the experiment out to its end."

As the result of these and other inquiries and the desire of the Commonwealth to hasten, if possible, the substitution of white for coloured labour, the *Sugar Bounty Act of* 1905 was passed. In this Act "white-grown cane" was defined as sugar-cane produced on a white plantation and in the production of which white labour only had been employed. It was provided that after 1st January, 1907, a bounty of 6s. per ton, calculated on cane giving 10 per cent. of sugar, to be increased or decreased according to variation from standard should be paid. The grower was obliged to certify to the rates of wages paid to any labour employed by him other than members of his own family.

An *Excise Tariff Act of* 1905 fixed the excise at 4s. per cwt. as from 1st January, 1907, up till 1911.

By these Acts the excise on sugar was increased, but that produced by white labour received a higher bounty. These rates were equivalent to £4 per ton excise and £3 per ton bounty, and for the respective cane districts worked out as follows:—

Name of District.	Average number of tons of cane to make one ton of sugar.	Average sugar-giving contents of cane.	Rate of bounty per ton of cane.
		Per cent.	s. d.
No. 1 District	8 00	12·5	7 6
No. 2 District	8·57	11·66	7 0
No. 3 District	9·22	10·84	6 6
No. 4 District	10 00	10·00	6 0

This had the effect of still further increasing the proportion of white-grown sugar. By 1908, white labour was producing 87·89 per cent. of the Queensland sugar crop.

Subsequent Acts in relation to the bounty and excise came into force in 1910, but these did not alter the amounts collected as excise or paid as bounty. It had been intended that the excise to be collected and the bounty to be paid in 1911 and 1912 should be two-thirds and one-third of the existing rates, but these clauses in the Sugar Excise and Bounty Acts of 1905 were to be omitted. Further conditions were embodied in the 1910 Sugar Bounty Act as to rates of wages and conditions of employment, setting out that the Minister might withhold the bounty if he found that the rates of wages and conditions of employment, or any of them, were below the standard rates and conditions of employment prescribed by any Commonwealth or State Industrial Authority, or, in the absence of any such standard applicable to the case, were below the standard rates payable and conditions of employment obtainable in the locality in which sugar is grown, or, in the absence of any such standard, are on application by the Minister to the President of the Commonwealth Court of Conciliation and Arbitration declared not to be fair and reasonable by him or by a Judge of the Supreme Court of a State, or any person or persons who compose a State Industrial Authority to whom he might refer the matter.

The question of wages to be paid to white labourers in the industry was one that exercised the Commonwealth Government from 1905 on to the end of the bounty system. In 1907, the Acting Minister for Trade and Customs stated that if the rates paid were not less than those mentioned below the payment of bounty would not be imperilled:—

	Per week and found.
During off season	22s. 6d.
For harvesting	25s.
Boys under 16	10s. to 15s.
Youths from 16 to 18	15s. to £1
Old, infirm, or non-ablebodied workers	15s. to £1

In all cases where employees were not "found," the weekly wage to be 10s. extra.

No deductions for keep from weekly wages to be made on account of wet weather; hours of labour from 50 to 60 per week.

Contract rates to be such as were mutually agreed upon between employers and employees, provided such rates were not less than an equivalent to the weekly rates above mentioned.

In 1912, fresh regulations were issued increasing the minimum rates of wages that had to be paid if bounty were to be claimed. These were as follows:—

	Per week.
Adult Labour—	
With keep	£1 16s.
Without keep	£2 8s.
Youths—	
From 16 to 18 with keep	£1 4s.
Under 16 with keep	£0 16s.

Old, infirm, or non-ablebodied men and full-bred aboriginals, £1 4s. per week with keep.

Hours of labour, 48 per week.

Where remuneration does not include keep, the value of such keep to be considered as 12s. per week; overtime for adults 1s. per hour, and 8d. per hour for youths from 16 to 18 years, and 6d. for youths under 16.

By 1912, practically all the cane was being grown by white labour, and a feeling was being manifested that the industry would be better off under State control than under that of the Commonwealth. This question gave rise to violent discussions and was freely debated for some time. The change over to State control will be dealt with in the next article.

[TO BE CONTINUED.]

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Bureau of Sugar Experiment Stations.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS.

These monthly hints were first commenced by the writer in November 1923; the present issue—dealing with farming activities for the month of April—being the seventy-seventh publication of such advice notes, which describe the various insect pests of sugar-cane likely to be met with just now, how to recognise same, and approved methods for combating them. In publications of this nature it is impossible to altogether avoid a certain amount of repetition, seeing that many of the species of insects occurring, for example, during the present month of April will probably cause similar injuries to cane a year hence.

The main object aimed at, however, is to jog the memory of our growers at the critical time, when the enemy is likely to be in evidence amongst their crops.

In the case of insidious attacks from those insects which work in the dark, as it were, either in the middle of the sticks or in the basal portion of young shoots of plant or ratoon cane, it is always well to be forewarned of their presence.

Cane Inspection by the Farmer.

Growers would find it a good plan to make periodical visits of inspection throughout their cane-farms. These should be taken systematically, with view to covering, when possible, the entire area under crop. Each block should be inspected at times when the cane is from 1 to 2 feet high, and again when the sticks are 3 to 4 feet high.

During the former early stage of growth a look-out must be kept for "dead-hearts," which, if present in more than 5 per cent. of the stools, should be brought under the notice of the Entomologist at Meringa Experiment Station ('Phone 95, Gordonvale). This advice applies also to discovery during such field inspection of caterpillars eating the young cane-leaves. Any outbreaks of army worm or grass caterpillars can then be dealt with at once by means of special spraying equipment recently procured for such control work.

On the other hand, when the sticks are well advanced or are nearing maturity, such inspection work should be concentrated for the most part on the bottom of the sticks, from 3 to 12 inches above ground level, for evidence of beetle-borer attack. The presence of this weevil is usually betrayed by small elongate holes of varying shape, from $\frac{1}{16}$ inch wide to $\frac{1}{8}$ to $\frac{3}{8}$ inch in length, which are often edged with dusty matter or grains of excreta, &c., of a lighter colour than the surface of the stick, and suggestive of the boring going on inside. In the event of such damage being noticed in 10 per cent. or more of the sticks, the Entomologist should be advised, in order that steps may be taken to stop further invasion of this formidable weevil-borer.

Bacterial Disease of Grubs.

Be on the look-out for dead or dying cane-grubs exhibiting black blotches on the sides of the body or leg-joints.

These will probably be affected by bacterial disease; but, unlike those attacked by Green Muscardine fungus, instead of hardening internally remain quite flaccid, and finally decompose to a black evil-smelling mass. Growers chancing to notice grubs smitten with bacterial disease are urged to communicate at once with the Entomologist at Meringa.

Clean Cultivation Promotes Successful Fumigation of Cane Grubs.

The advice, "Whatever is worth doing is worth doing well," is familiar to all of us, and applies particularly to those cane farmers who neglect to work their soil sufficiently between the rows of cane. In the case of growers who have more land under crop than they can properly manage such neglect is usually due to want of time, which prevents them from working their cane to the best advantage.

Our chief aim, however, should be to gradually bring the first few inches of top soil into an even friable condition, and this can only be achieved by stirring it at frequent intervals, and whenever the surface becomes caked after heavy rain.

On areas liable to become grub-infested, or thought likely to be attacked by this pest, such cultivation is very important, not merely because tending to destroy a small percentage of the eggs and very young grubs, but also on account of the establishment of those level, uniform, and mechanical conditions of soil porosity which are most suitable for successful operation of the various machines used for the fumigation of cane grubs.

Apart from the question of insect control, such repeated aeration of cane land soon causes it to become "sweet," and renders available abundant plant food for young feeding-roots near the surface. Again, by breaking the surface crust evaporation of moisture is prevented by the mulch so formed, while the water rises and remains at the level occupied by the young roots of the cane.

Collecting Grubs of Cane Beetles.

Every grub of the greyback cockchafer collected by you means about twenty-seven grubs less for next season. This useful work should be kept up during ploughing operations, and constant encouragement given to insectivorous birds to pick up grubs, &c.

At present (May) these larvæ are in the second and third stages of development, and may be recognised by the width across the head, being ¼ and ⅜ of an inch respectively.

It is well to remember that this common-sense method of control for cockchafer grubs is believed in other sugar-growing countries to be very beneficial, and practised as a matter of course. The value of dried grubs of this beetle as a fertiliser is about £11 per ton, which is higher than that quoted for those of the European cockchafer.

Indications of Grub Infestation.

Signs of the presence of these insidious larvæ are likely to become noticeable during the latter half of the present month (May), when cane so injured usually assumes a yellowish tinge, which in severe attacks soon turns brown and withered.

Growers must not be too hopeful of escaping grub damage, as such manifestations will probably be delayed this season owing to the beetles having made a late emergence from the ground.

Occurrence of Green Metarrhizium Fungus.

Grubs killed by this vegetable parasite are usually noticed during the months of April to June. When attacked by this fungus the grub, instead of decomposing, retains its ordinary shape, and gradually hardening turns at first white and then olive green. At this stage it is filled with roots of the fungus, and becoming mummified and of cheese-like consistency can be easily broken into pieces.

Growers would do well to collect all such green crusted-looking grubs, crush them into powder, and thoroughly mix this with about 100 times the quantity of moist, finely-sifted soil.

Such spore-laden earth should then be sprinkled as thinly as possible in the plough furrows when cultivating land known to be liable each season to grub infestation.

CANE PRICES—NEW REGULATIONS.

The Governor in Council has approved of an Order in Council cancelling all previous assignments under the Regulation of Sugar Cane Prices Acts, and substituted fresh ones therefor.

Since the passing of the original Regulation of Sugar Cane Prices Act in 1915, there were made certain assignments of land to the various sugar-mills under the jurisdiction of the Central Sugar Cane Prices Board. The effect of the assignment was to entitle the holder of the land assigned to the benefits of awards in existence with respect to the mill which he supplied with sugar-cane.

These assignments were very wide in so far that whole blocks of land were assigned irrespective of the area of that land which was fit to grow cane. In the new assignments action is taken to define the area to which each grower is entitled to cultivate and harvest annually. Without an assignment no grower is entitled to the benefits of the award or of the peak year scheme—that is, the scheme adopted by the industry and the Government with respect to the quantity of sugar to be included in the No. 1 Pool—that is, to the benefits of the average of the home consumption and export prices. In other words, any grower outside the peak year scheme is entitled to export prices only.

In the *Gazette* notice issuing the assignments the Minister is intimating that any grower may write to the secretary of the Central Sugar Cane Prices Board, Brisbane, so as to reach him not later than the 15th May, 1930, pointing out any error or anomaly in any assignment. If the Central Sugar Cane Prices Board recommends any alteration of the assignments before the 16th June, 1930, steps will be taken to correct the assignments.

The Central Sugar Cane Prices Board, in preparing the new assignments, generally accepted the position as they found it at the time their secretary made his visit to the various districts—that is say, broadly, the areas recommended were restricted to the actual land under cultivation at this time. This being so, the Board's attitude to the lands now assigned may be gauged by the answers to the following questions raised by the secretary of the Cairns Cane Growers' Association, the answers in question being given below. Exceptions to these answers occurred only in cases where the Board, in their recommendation, have deliberately allowed for the bringing in of new land, as, for instance, in the case of a farmer who has bought in recent years and has had no time to take full advantage of the old assignment.

Question (1).—If a grower cannot make up to his total assignment without clearing more land or without using land that was in process of being cleared in 1927, can he make use of such land?

Answer (1).—No.

Question (2).—If a grower had land under cane in 1927 that was not assigned or permitted by a mill in 1927 and his total recommendation is not sufficient to include his older assigned land and this new land, can he leave out some of the older assigned land and include the newer lands?

Answer (2).—No. This position should not arise.

Question (3).—If a recommendation is made in terms of subdivision 2 of portion 167, total 60 acres, yearly harvest 45 acres, and this subdivision consists of a larger area than 60 acres (say 100 acres), can a grower grow cane on any portion of that subdivision if he has more than 60 acres cleared and fit for growing?

Answer (3).—No.

Question (4).—If a grower starting on new land on a farm prior to 1926 finds that portion of the area selected by him for canegrowing is unsuitable, can he clear a similar acreage in substitution instead of going on with the grubbing and stumping of the old portion?

Answer (4).—No.

Question (5).—If portion of a grower's land on which he has been growing cane is washed away by floods, can he bring in an equal area of new land?

Answer (5).—Not without the permission of the Central Sugar Cane Prices Board.

Question (6).—If a grower finds that the original information tendered by him or on his behalf to the secretary of the Central Cane Prices Board in 1927 is erroneous, can he amend it?

Answer (6).—Yes.

The Board has been asked to assign lands to the Mulgrave Mill for the proposed peak year scheme, but as no Local Board has been constituted and none has been asked for by the mill or the growers, the Board is doubtful as to its powers to make such assignment.

The special *Gazette* which contains the new assignments consists of sixty-four pages and contains the assignments of the following sugar-mills:—Cattle Creek, Macknade, Victoria, Childers, Isis, Babinda, Bingera, Fairymead, Farleigh, Gin Gin, Goondi, Hambledon, Inkerman, Kalamia, Maryborough, Marian, Moreton, Mount Bauple, Millaquin, Mourilyan, Pioneer, Plane Creek, Pleystowe, Proserpine, Qunaba, Racecourse, North Eton, South Johnstone, Invicta, Mossman, and Tully.

LOCAL SUGAR-CANE PRICES BOARDS.

Millowners' Representatives, Canegrowers' Representatives, and Chairmen of the various Local Sugar Cane Prices Boards throughout Queensland have been appointed as under:—

Babinda Local Board—
Millowners' Representatives—F. A. Lamont and W. J. Ryan.
Canegrowers' Representatives—D. O. James and S. H. Warner.
Chairman—A. Anderson.

Bingera Local Board—
Millowners' Representatives—B. A. Bourke and Dr. A. Gibson.
Canegrowers' Representatives—N. Poulsen and L. G. Scotney.
Chairman—C. D. O'Brien.

Cattle Creek Local Board—
Millowners' Representatives—P. H. McLean and C. Simonsen.
Canegrowers' Representatives—R. Allen and W. G. Merrill.
Chairman—T. E. Dwyer.

Childers Local Board—
Millowners' Representatives—C. R. Fletcher and M. B. Heath.
Canegrowers' Representatives—J. Broadhurst and J. W. Clayton.
Chairman—H. B. Carney.

Fairymead Local Board—
Millowners' Representatives—E. J. A. Crabtree and E. S. Young.
Canegrowers' Representatives—P. E. Scotney and F. J. Wheeler.
Chairman—C. D. O'Brien.

Farleigh Local Board—
Millowners' Representatives—T. G. Mulherin and J. Smith.
Canegrowers' Representatives—P. Kirwan and N. Manning.
Chairman—M. Gallagher.

Gin Gin Local Board—
Millowners' Representatives—E. N. Annand and C. M. English.
Canegrowers' Representatives—J. Laurison and G. Powell.
Chairman—C. D. O'Brien.

Goondi Local Board—
Millowners' Representatives—R. T. Challinor and D. A. Williams.
Canegrowers' Representatives—W. D. Davies and R. C. Lacaze.
Chairman—A. E. Aitken.

Hambledon Local Board—
Millowners' Representatives—K. L. Cragg and L. M. Smith.
Canegrowers' Representatives—A. W. Browne and F. C. P. Curlewis.
Chairman—A. Anderson.

Inkerman Local Board—
Millowners' Representatives—H. G. Bell and W. Gibson.
Canegrowers' Representatives—S. W. Gibson and F. J. Woods.
Chairman—G. A. Cameron.

Invicta Local Board—
Millowners' Representatives—H. B. Burstall and J. L. Mullins.
Canegrowers' Representatives—P. Hayes and H. F. Hecht.
Chairman—G. A. Cameron.

Isis Local Board—
Millowners' Representatives—A. Adie and J. Alison.
Canegrowers' Representatives—W. M. Duncan and W. G. Sherrington.
Chairman—H. B. Carney.

Kalamia Local Board—
Millowners' Representatives—R. H. Calcutt and G. G. Jerdan.
Canegrowers' Representatives—B. S. Donovan and W. H. Ferguson.
Chairman—G. A. Cameron.

Macknade Local Board—
Millowners' Representatives—A. H. Edwards and J. R. Kerr.
Canegrowers' Representatives—G. Cantamessa and T. J. McMillan.
Chairman—J. A. Murray.

Marian Local Board—
Millowners' Representatives—A. J. Coyne and J. O'Neill.
Canegrowers' Representatives—J. Binstead and E. C. Walz.
Chairman—M. Gallagher.

Maryborough Local Board—
Millowners' Representatives—T. E. Braddock and O. C. Kinne.
Canegrowers' Representatives—F. F. Bertram and H. Doss.
Chairman—J. M. Bracewell.

Millaquin Local Board—
Millowners' Representatives—G. S. Moore and E. P. Wyllie.
Canegrowers' Representatives—T. Scotney and G. F. Tesch.
Chairman—C. D. O'Brien.

Moreton Local Board—
Millowners' Representatives—G. Greathead and W. M. Whalley.
Canegrowers' Representatives—W. Kittle and A. E. Williams.
Chairman—S. L. Stormonth.

Mossman Local Board—
Millowners' Representatives—W. H. Crawford and C. H. O'Brien.
Canegrowers' Representatives—R. D. Rex and H. B. Schnitzerling.
Chairman—T. Keleher.

Mount Bauple Local Board—
Millowners' Representatives—T. Beattie and J. C. Flanagan.
Canegrowers' Representatives—R. A. Maike and P. B. Scougall.
Chairman—J. M. Bracewell.

Mourilyan Local Board—
Millowners' Representatives—L. J. Duffy and R. Sloan.
Canegrowers' Representatives—E. R. Campbell and J. F. McCutcheon.
Chairman—A. E. Aitken.

North Eton Local Board—
Millowners' Representatives—G. Johnson and S. H. Scougall.
Canegrowers' Representatives—G. N. Laws and C. H. C. Ross.
Chairman—T. E. Dwyer.

Pioneer Local Board—
Millowners' Representatives—B. C. J. Martin and C. S. Wynter.
Canegrowers' Representatives—B. S. Donovan and W. C. Smith.
Chairman—G. A. Cameron.

Plane Creek Local Board—
Millowners' Representatives—D. Greetham and J. C. Nicholson.
Canegrowers' Representatives—C. W. Davidson and P. McCowan.
Chairman—M. Gallagher.

Pleystowe Local Board—
Millowners' Representatives—R. Clarke and J. W. Inverarity.
Canegrowers' Representatives—M. W. R. Bowman and C. McKinley.
Chairman—M. Gallagher.

Proserpine Local Board—
Millowners' Representatives—C. C. Dodd and M. R. Gibson.
Canegrowers' Representatives—H. L. Hall and T. G. Mann.
Chairman—C. A. K. Morrison.

Qunaba Local Board—
Millowners' Representatives—G. S. Moore and W. A. Shield.
Canegrowers' Representatives—A. J. Christensen and C. F. Mittelheuser.
Chairman—C. D. O'Brien.

Racecourse Local Board—
Millowners' Representatives—J. M. Gibson and A. S. Hamilton.
Canegrowers' Representatives—A. Turner and T. J. H. Whitcomb.
Chairman—T. E. Dwyer.

South Johnstone Local Board—
Millowners' Representatives—F. Gillan and F. H. Gilmore.
Canegrowers' Representatives—R. G. O. Jones and D. V. Woods.
Chairman—A. E. Aitken.

Tully Local Board—
Millowners' Representatives—G. R. Blair and J. J. Cran.
Canegrowers' Representatives—H. Henry and H. N. Lund.
Chairman—A. E. Aitken.

Victoria Local Board—
Millowners' Representatives—N. R. Dowling and J. R. Kerr.
Canegrowers' Representatives—H. E. Hollins and G. G. Venables.
Chairman—J. A. Murray.

SOME COMMON VEGETABLE PESTS.*

By ROBERT VEITCH, B.Sc., F.E.S., Chief Entomologist.

The Cabbage Aphis.

The so-called cabbage aphis (*Brevicoryne brassicæ* L.) on occasions becomes quite abundant in Queensland cabbage crops, and when it does so it is by no means an easy pest to control. In addition to attacking cabbages it may also commonly be found on cauliflowers, turnips, brussels sprouts, radishes, and kohl-rabies.

Once it has become established in a cabbage crop it is capable of very rapid multiplication if conditions are favourable, and eventually large colonies of this greyish-blue insect can be seen on both the upper and lower surfaces of the leaves of infested plants. Like all aphids this pest lives by sucking the sap of its host plant, and if it is present in large numbers the plants will become seriously stunted and produce obviously sickly, yellowish-looking leaves. In severe infestations, some of the more heavily attacked plants may actually die off.

So far as is known, the life history of this pest has not yet been worked out in detail in Queensland, but some considerable amount of attention has been devoted to it elsewhere, particularly in North America. These investigations have shown that its life history is somewhat complicated, but the details thereof need not be discussed in these notes. Both winged and wingless females occur. The insect is a somewhat pear-shaped, soft-bodied, slow-moving individual, the body being covered with a white waxy bloom.

CONTROL MEASURES.

With respect to control, this is generally attempted by the use of either nicotine sulphate or kerosene emulsion sprays, preference now being given to the former insecticide. When the aphids are actually wet with the spray the result is quite satisfactory, but in practice difficulties exist in its application. The body of the aphis, as already mentioned, is covered with a fine film of wax which renders effective wetting of the insect a matter of some considerable difficulty. Furthermore, the aphids are so protected in their colonies on the leaves that it is frequently difficult to reach all of them with the spray.

Nevertheless, in spite of these adverse factors, spraying with nicotine sulphate, "Black-leaf 40," reduces infestation appreciably, thus allowing the young plants to continue growing. The formula that is generally recommended is ¾ pint of "Black-leaf 40" in 100 gallons of water to which 4 or 5 lb. of soap is added. Kerosene emulsion may be used if nicotine sulphate is not readily available. The preparation of this emulsion has already been dealt with in the chapter devoted to the discussion of insecticides.

Natural enemies play some part in checking this pest in Queensland, and not infrequently the aphis is heavily attacked by small wasp parasites. In spite of the presence of these beneficial insects, however, the aphis, as has been said, quite frequently gets out of hand. In such a case spraying must be adopted, and in doing so it is highly desirable to commence operations as soon as there are signs of the aphis becoming unduly abundant.

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* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc. Published by the Department of Agriculture and Stock, Brisbane.

The Diamond-back Moth.

The diamond-back moth (*Plutella cruciferarum* Zell.) is probably the most serious pest of cabbages in Australia. It is one of a large number of undesirable insect introductions from Europe, where it is well known as a pest not only of cabbages but also of turnips and other crops. It attacks cabbages, cauliflowers, turnips, brussels sprouts, radishes, and horse radishes, as well as some other crops of importance, and it has also been recorded from several garden flowers and from a number of weeds. It has gradually become distributed throughout the world, both in the tropic and the temperate zones. In Queensland it is considered primarily a pest of cabbages.

The very minute eggs are laid on the leaves of the cabbages, and the larvæ or caterpillars hatch out after a brief incubation period. These larvæ feed on the foliage, and eventually the attacked leaves become riddled with holes at the spots where feeding has taken place. The larvæ grow fairly rapidly, and after passing through a series of moults they attain full size when they are slightly less than ½ inch in length. They are green in colour, and are rather slender, active, spindle-shaped caterpillars clad with only a few short bristles. The full-grown larvæ cease feeding, and then pupate on the leaves in very beautiful, silken, lace-like cocoons the strands of which are so loosely woven together that the pupæ can be distinctly seen within. The moths emerge from the pupæ after the usual transformation processes have taken place.

The moth is rather a pretty little greyish-brown species with a wing-spread of about ⅔ inch, the name "diamond-back" having been conferred upon it as a consequence of the appearance the male moth presents when at rest with the wings folded. The pattern of the front wings is such that when they meet on being folded there appears a chain of three diamond-shaped marks. The wing pattern is less definite in the female moth and the same chain effect is not produced. The moth when at rest tilts its wings in a very characteristic fashion.

CONTROL MEASURES.

Spraying is largely adopted for the control of the diamond-back moth, and a certain measure of success attends this procedure, although it cannot be claimed to be thoroughly effective. Arsenate of lead sprays are used against this pest, but, on account of the possible danger to the consumer, cabbages should not be sprayed with this poison after they have commenced to heart.

Kerosene emulsion has been recommended by some investigators as useful for keeping down infestation in young plants, and nicotine sulphate has been recorded as being similarly successful. Watering the cabbages with very hot water is also said to be a useful procedure, but for obvious reasons it can be adopted only on a relatively small scale. It is claimed that the water can be applied sufficiently hot to kill the caterpillars without appreciably injuring the fleshy foliage. When cabbages are grown commercially it would generally, however, be necessary to employ one of the three insecticides just mentioned, namely, arsenate of lead, nicotine sulphate, or kerosene emulsion. To achieve success, spraying must be repeated several times and must be commenced early in the life of the crop.

Stricter attention to farm hygiene than is sometimes given by cabbage-growers will also be productive of beneficial results. All too often the grower cuts the marketable cabbages, and leaves the useless ones to rot on the ground and to act as breeding grounds for myriads of cabbage moths, which naturally immediately infest any new area he may plant up in the vicinity. Where it is practicable to do so, this source of danger should be eliminated.

The cabbage-grower attempting control along the lines indicated in the preceding paragraphs will obtain some measure of relief, but it must be admitted that the control of this pest is as yet on a somewhat unsatisfactory basis.

The Pumpkin Beetle.

The pumpkin beetle (*Aulacophora olivieri* Guérin) is an important pest of cucurbitaceous plants, and it may very frequently be found in large numbers on the vines, feeding on both the foliage and flowers. It is quite the most serious Queensland insect enemy of pumpkins and allied plants.

It commonly attacks pumpkins, water-melons, rock-melons, cucumbers, and vegetable marrows. On one occasion it was also recorded in New South Wales as a pest of ripening cherries, but such an attack appears to be of a somewhat abnormal nature, and for present purposes it may be regarded exclusively as a pest of cucurbitaceous plants such as those mentioned.

The beetle, which is responsible for the destruction of the flowers and foliage, is a very conspicuous insect measuring about ¼ inch in length, the length being about twice as great as the width. It is orange-yellow in colour with two very distinct large black blotches on each wing-cover. This species is frequently referred to as a ladybird, but it is quite distinct from the ladybird beetles, which are different in outline, being decidedly rounded whereas the pumpkin beetle is definitely elongate in shape. In the leaf-eating ladybird, damage to the foliage is inflicted by both the beetles and their larvæ, but, in the case of the pumpkin beetle, foliage and flower losses are caused by the beetles alone, for their larvæ have been recorded as possessing root-frequenting habits.

Control Measures.

With respect to the control of this pest, a certain measure of success may be obtained by spraying or dusting the attacked plants with arsenate of lead. As an alternative to spraying or dusting, the beetles, where numerous, may be collected by shaking them into shallow containers in which a mixture of kerosene and water has been placed. This operation is most successfully performed when the beetles are sluggish and do not readily take to flight on the infested plants being jarred; it should therefore be carried out in the early morning. It is particularly important to destroy any beetles that show up early in the season, and the expenditure of energy involved in the operation will generally be amply repaid if the young plants are periodically carefully examined, and the beetles found associated with them destroyed.

Young plants may be protected from attack if the seedlings are covered with some form of netting which has been stretched over a suitable framework to prevent the beetles gaining access to the seedlings. Such a protective measure, however, is practicable only on a small scale.

It will, nevertheless, tide the seedlings over a very dangerous period when the attack of a few beetles may very seriously injure or even kill the infested plant.

A further control measure that has been suggested by some investigators is to liberally dust the plants with wood ashes or lime, or alternatively with road dust. This procedure is said to act as a satisfactory repellent in outbreaks of ordinary severity.

The Bean Fly.

As a result of the presence of the bean fly (*Agromyza phaseoli* Coq.), the growing of beans in coastal Queensland is often rendered quite unprofitable during the warmer months of the year. Bean plants which may be growing under ideal conditions of soil and climate are all too frequently noticed to be in a far from flourishing condition. The plants may be wilted and stunted, and they may eventually fall over or break off and die.

The unhealthy condition of these plants is in all probability due to the presence of bean-fly infestation, and such a suspicion can be confirmed quite readily by an examination of the stalk of an affected plant. In typically infested plants the stalks will be found to be abnormally swollen in many places, and furthermore they will be seen to be frequently split open where the swellings occur. An examination within the tissue of these swollen fissured areas will usually speedily disclose the presence of the creamy-coloured maggots responsible for the damage. These feed within the tissue of the stalks and produce the effects just described. When full-grown the maggots pupate in the stalks, the pupæ being enclosed within small yellowish-brown puparia. At the end of the pupal period the very insignificant black flies emerge.

CONTROL MEASURES.

It has been found in practice that the control of this pest is a matter of very considerable difficulty. The use of sprays does not offer any appreciable prospect of success, but eventually a repellent may be found that will justify application with the object of preventing the female fly from laying her eggs on the bean plants. In the meantime, however, the grower of beans must fight this pest by strict attention to market garden hygiene.

The bean-fly population may be appreciably reduced by the prompt destruction of useless infested plants. These should be pulled up and burned, instead of being allowed to remain in the ground to breed out further batches of flies from the maggots and pupæ which they are harbouring. The time devoted to the application of this quite simple control measure will generally be time well spent.

It has also been found that some measure of relief may be obtained by hilling up the plants so that they may have a chance of producing adventitious roots above the injured portions at the base of the stem.

The Onion Thrips.

The only insect pest of onions that commonly comes under the notice of the entomologist in this State is the onion thrips (*Thrips tabaci* Lindeman). This destructive little insect is a relative of the species that is responsible for "rust" in bananas.

The onion thrips is a very delicate yellow or yellowish-brown insect possessing two pairs of characteristically fringed wings and measuring about $\frac{1}{25}$ inch in length. It is practically cosmopolitan, and is a pest of a very wide range of economic plants, although for present purposes it will be considered solely as an enemy of onions.

The adult and nymphal or immature thrips both attack the leaves of the onion plant. They lacerate the surface of the foliage and feed on the plant sap where the surface has been injured. At each point of attack a small white blotch develops, and the whole plant may eventually be covered with these silvery or white blotches. The leaves wilt and fall over, and a reduction in the yield of the crop must obviously be expected when the thrips infestation is severe. The condition produced as a result of the feeding of this pest is often referred to as "white blast."

Control Measures.

When the onion crop is infested by this thrips, spraying with nicotine sulphate should be practised. This procedure is generally productive of good results in the case of young crops, but in the older crops satisfactory application of the spray is more difficult, and results are not so good. Spraying with nicotine sulphate is, nevertheless, quite worth while even in the case of older plants. Several applications of the spray are usually necessary in order to produce the desired results.

SOME OBSERVATIONS ON THE *ONCHERCERCUS GIBSONI* IN ITS UNINCAPSULATED FORM IN QUEENSLAND CATTLE.

By J. A. RHEUBEN, Inspector of Stock, Brisbane.

Following on experiments conducted in 1920 at the Stock Experiment Station, Townsville, by Mr. A. McGown, M.R.C.V.S., and the writer, and reported in the Annual Report of the Department of Agriculture and Stock for that year, and observations made from time to time by Dr. R. W. Cilento and the writer, and reported in an article headed "The Possibilities of the Transmission of *Onchercercus Gibsoni*" published in the "Medical Journal of Australia," Vol. 1, No. 16, and the publication by Dr. Heyden of his article, "Observations of the Larvæ of the *Onchercercus Gibsoni*," published on the 3rd March, 1927, the writer was led to inquire into the cause of the presence of these larvæ.

As a result of these investigations I am now able to record that 90 per cent. of the cattle slaughtered for human consumption in the Brisbane metropolitan area are heavily infected with the unincapsulated *Onchercercus Gibsoni* in colonies of males, females, and larvæ.

On 19th February, 1929, Inspector Herbert Hunter of the Stock Department and the writer carried out investigations on twenty-nine head of cattle slaughtered at a private abattoirs at Salisbury, and of these carcasses twenty-eight were infected.

On the 4th April of this year Dr. J. Legg, Mr. G. E. Rogers, and the writer inspected fifty-three carcasses of oxen, all of which proved to be infected.

The principal sites of infection in the forequarters proved to be in the Ligamentum Nuchae and the connective tissue between the trapesius, the illeo, spinalis, and the ceratus magnus muscles.

In the hindquarters, in the connective tissue of the popliteal space the quadraceps femoris, the vastus externis, and the gastronemius muscles and also in the pocket formed by the ligament semi-membranosis at its insertion. On several occasions I have removed from these localities both sexes, the female up to 11 feet in length and males up to 1 foot.

The reason for this article is to show that one of the main seats of infestation by this parasite has not been thus far observed by previous investigations.

My thanks are due to Major A. H. Cory, Chief Inspector of Stock, for his sympathetic assistance given me during my investigations.

At a later date I propose to publish the result of my eleven years' investigations into the life history of this parasite.

SHEEP MAGGOT FLIES.

W.

The Minister for Agriculture and Stock (Mr. Harry F. Walker) has furnished the following memorandum on Sheep Maggot Flies, submitted to him by Mr. J. Carew, Senior Instructor in Sheep and Wool.

MOISTURE on sheep is an attraction to blowflies, and it is also necessary in their development from the larvæ stage to the adult fly. In the event of a sheep dying, blowflies are likely to deposit their eggs or larvæ within a few hours. For the first week or so the carcass usually gives off a considerable amount of moisture, and as the feeding period of the larvæ only lasts from four to six days they can find sufficient moisture about the carcass to pupate, from which they emerge within two weeks. Dry and cold conditions deter their development. The first step to take to control flies is the attention to dead animals or carrion of any description, which may either be destroyed or converted into a trap of destruction by sprinkling arsenic or powder poison dip over, under, and about the medium of infestation.

In accordance with previous observations, their actual numbers did not indicate the intensity of attack, but rather that they worked up to intensive attack by waves.

Each species predominates in the adult stage at definite seasons peculiar to itself, and some of these species indicate that they cause more serious effects than others even when smaller numbers are present.

Since the experiments at Dalmally were discontinued in 1923 very little, if any, progress towards either control or prevention has been made. From about 1925 until last year the blowfly attack has been very light, no doubt owing to the drier conditions, but in some districts, chiefly during the spring of last year, they became very troublesome.

Health of Sheep a Prime Factor in Resistance of Attack.

These years of quiescence left the sheepowners rather careless regarding the protection of their flocks, as the numbers struck did not usually exceed the odd ones that were treated by hand dressing. With the advent of a fair summer rainfall and the gradual increase of the fly, no opportunity should be lost in getting the sheep in such a state as best to resist an attack. This resistance may be assisted in many ways, but the first thing to be considered is the health of the sheep.

Parasites, either internal or external, render the sheep more prone to fly attack. Internal parasites, especially stomach and intestinal worms, are the worst offenders, for when they become troublesome they cause derangement of the digestive organs, resulting in mild to severe scouring according to the severity of attack. This scouring will develop whether the sheep are on a scanty pasture or not, with the result that if flies are present the scouring sheep affords a suitable striking medium.

If the feed is green and plentiful the excreta of the sheep is likely to become soft and adhere to the wool. If a few flies are about after the first rain an increase can be expected, but, by the time they become numerous, if the dags are dry no serious attack can be expected, but should a shower of rain fall and these dags become damp a serious attack may occur. Should the sheep be crutched, shorn, dipped, or jetted beforehand, much trouble is saved and probably no complete estimate of the advantage derived from the operation, whichever it may be, is made. Should the sheep be in half wool or longer when the attack occurs, the quickest way of giving protection is the most satisfactory, for once a sheep is struck other flies are attracted, probably resulting in a severe infestation in a few days. Other sheep in the flock may be struck, but any mustering where clean sheep are brought into contact with those that are blown only encourages further trouble unless the flies are destroyed or the sheep protected.

Jetting or Dipping.

Jetting or dipping suggest themselves, for either of these methods, if properly done, will kill the maggots on the sheep as well as poison many of the flies that are attracted by the moisture in the wool. The two chief points to be considered are to see that the poisoned liquid penetrates to the skin and that it is of the desired strength.

Jetting is performed by forcing the prepared liquid through a nozzle into the crutch of the sheep. The area that should be jetted as a safeguard against the attack of the fly should be over a space extending from above the tail and carried down at each side of it to the crutch, which should take in all the stained portion.

Length of wool or the presence of dags does not matter, provided the mixture is forced to the skin. The long wool will hold more poison, thus giving a greater amount of protection. Sheep that are struck should be jetted without being crutched. When the sheep are returned to their pasture, if time permits those showing distress may be given any further treatment that may be necessary. If the wool is removed, the usual force of jet would be too severe and cause injury, if not death. A hospital paddock should be set aside for all affected sheep; this for two reasons—firstly, to save travelling and hold them in a convenient paddock; and, secondly, once a sheep is struck it is more subject to further attack and is best kept out of the healthy flock.

The Committee of Investigation under the Council for Scientific and Industrial Research, who conducted the experiments at Dalmally, concluded that jetting with a solution consisting of 7 lb. arsenic with an equal quantity of carbonate of soda to 100 gallons of water gave 90 per cent. protection for three months.

PLATE 72.—A CASE FOR TREATMENT.

The weather at and after jetting is an important factor, but it is regarded that the quantity of arsenic in the wool of the breach is the ingredient giving protection. Many dip mixtures are on the market, those containing arsenic being the most effective in protecting sheep.

The pressure necessary varies according to the length of wool from 160 lb. per square inch for sheep carrying eight months' wool to 60 lb. per square inch for crutched or shorn sheep. Jetting in an ordinary race is not so satisfactory as where the sheep are in a raised race. The upward tendency when applying the jet is a

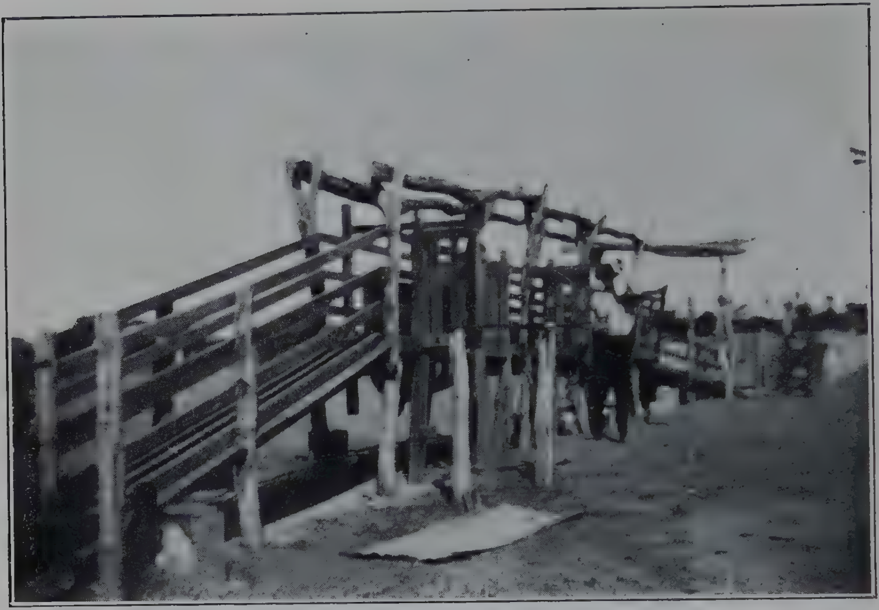

PLATE 73.—JETTING RACE, BARATRIA STATION.
Note hand raised to pull cord in closing swing gate. Total length of race 50 ft., width 16 in., height to 3 ft. 6 in.

PLATE 74.—JETTING SHEEP AT BARATRIA STATION, 1929.
Note hand on lever to open sliding gate.

decided advantage, besides which the surplus mixture which falls from the wool may be recovered. This, on analysis, loses very little strength. Where small numbers are to be treated a hand-pressure pump will be sufficient, but in dealing with large numbers a power plant is more suitable.

When investigating the blowfly trouble in the Central-West last season the weight of evidence was in favour of jetting.

The Operation in Practice.—A Serviceable Plant.

Mr. Barton, Baratria Station, states that provided the jetting mixture is correct and properly applied, he has every confidence in its being the best means in protecting large flocks of sheep. On Baratria Station there are three elevated races which are the cheapest, simplest, and most economically worked that I have seen in use, and quite as efficient as any other style for thorough application. It is 50 feet in length and 3 feet 6 inches above ground level at the highest point just ahead of where the sheep is jetted. It is fitted with two sliding and one swing gate. This swing gate forms part of the side of the race. When the sheep passes this swinging gate the sliding gate is pushed across the race to hold it while being jetted. When the sheep is jetted the jet operator opens the sliding gate with his left hand by means of a long lever and at the same time opens the swing gate. The jetted sheep, seeing the opening in the race and also the jetted sheep in the yard, moves away and is followed by the next sheep, the sliding gate being pushed back to keep it in position while the swing gate is drawn back across the race by means of a rope by the man whose duty it is to keep the sheep up to the operator. This swing gate holds the next sheep back, and at the same time gives the opening in the side of the race to the operator to work the nozzle, which should be a straight jet.

The race is 16 inches wide inside measurement and is floored with battens 3 inches by 1½ inches spaced ¾ of an inch apart. The uprights in use were 3 by 2 inches hardwood, as were also the sleepers to carry the cross pieces in the race. The race is 14 feet in length, starting at the forcing yard at 6 feet, narrowing down to the race 16 inches wide. Bush timber for uprights would be suitable, as also for sleepers to carry the cross pieces in the race. These latter, as well as the cross pieces in the ramp, could also be split bush timber. While present, Mr. Barton jetted 100 sheep in twenty-five minutes, having four men keeping the sheep up to him.

If jetted sheep are blown the poison in the wool controls the growth and spread of the maggot.

Dipping.

This is another means by which both maggots and flies may be controlled and the sheep protected for several weeks.

The strength of the mixture should be at the rate of 2 lb. arsenic to 2 lb. carbonate of soda per 100 gallons of water when the wool is up to four months' growth. When the wool is longer the strength can be reduced to 1½ lb. at nine months' growth, but the longer the sheep must stay immersed.

Sheep should not be dipped immediately after shearing, but allowed about two weeks for the skin to recover and the cuts to heal. The sheep should not be thirsty or over-heated at the time of dipping. See that they are well drained before being put on the pasture, as the drips falling on the grass may be eaten by those following, which, if in sufficient quantity, would poison them. Fine weather should be selected and all sheep dipped as early as possible in order that they may become fairly dry before night.

Crutching also is an advantage, and to a great extent assists in protecting the sheep, as 90 per cent. are likely to be struck about the crutch. In picking out and crutching the sheep already struck, more harm than good is likely to be done, as mustering clean sheep and bringing them in contact with those that are blown usually causes a further spread of the trouble.

In crutching there is no attempt to deal with the fly, and it often happens that a few weeks after crutching 20 per cent. of the flock will be suffering from a fresh attack. As the maggots develop they do not find sufficient covering in the crutched part, with the result that they spread to the long wool. Their presence in the body wool soon induces flies to move to that part, where further trouble is generated.

If crutching is practised midway between shearings good must result, especially where ewes are treated, as by the time shearing comes on there is a sufficient length of wool to be properly shorn, but if the wool is short it is often missed, with the result that many sheep are turned out prone to a fresh attack at no distant date.

THE FAT LAMB INDUSTRY IN QUEENSLAND.

By J. L. HODGE, Instructor in Sheep and Wool.

THIS is a branch of the sheep industry which has been greatly neglected by the farmers of the State. The opening for very excellent profits is there, not only for farmers, but also for those graziers and pastoralists whose properties happen to be near the railway, or who are so situated that they can handle fat lambs by other means of transport, such as motor transit. The day has arrived when it is not a question if the farmer can run a few sheep, but rather whether he can afford to be without them.

Profitable Returns.

At the present time prices are depressed, but this is a condition in the industry which we have seen before with an ultimate recovery. Up to twelve months ago the prices realised in Brisbane fat stock markets have been most encouraging to the fat lamb grower, prices ranging from 7d. per lb. up as high as 9d. per lb., plus skin values, working out at an average of round about £1 per head.

On these figures the returns should be very profitable to the grower, but even at present prices they should be adequate.

Suitable Fodder Crops.

It is recommended that farmers growing fat lambs for market have some fodder crop. This should be ready when the ewes have lambed. They can then be put on with safety. Wheat, barley, oats, and panicum are all first class for the purpose, and in some cases when the flock is not too large the farmer may harvest a crop.

Attention to the Health of the Flock.

The utmost care should be taken of the health of the breeding flock.

Careful observation will detect the presence of the attacks of the blowfly. Immediate treatment is necessary to maintain the condition of the affected ewe. A letter to the Department of Agriculture and Stock will receive prompt attention and give the necessary treatment in this and other matters.

An early infestation of worms should be early detected, and the drenches recommended by the Department used.

Watch should be maintained, especially in our North Coast lands, for the attacks of scrub ticks. In fact, every care and attention should be given the flock, to which they so readily respond.

A sheep lick to suit the particular conditions of the country and flock may be advisable. In this case it is advisable to get in touch with the Department, so that a lick suitable may be prescribed.

The scientific use of a lick is to supply any proved deficiencies in soil, fodder, or water.

Care should be exercised when feeding sheep on growing lucerne. Hoven is the danger. Accustom the flock to the feed gradually, and in no case allow the flock in the cultivation during wet weather; this for two reasons—safety of the sheep firstly, and preservation of the paddock as a secondary consideration. Keep the flock away from the lucerne until well after sunrise on winter mornings. The lucerne paddock should be securely fenced to ensure the farmer being certain his intentions are carried out.

Foundation Stock.

As a basis of operations, and for the purposes of this article, I would advocate the use of a big, bulky, strong-woolled merino ewe, four to six years old. Younger ewes are not recommended on account of the possible loss in lambing. When discussing the ram to be mated with these ewes, the class of country, rainfall, and other matters must be taken into consideration. In all cases early maturity in the lamb is the object which should be constantly before the farmer.

Where some artificial feed is available, such as lucerne, a lamb should be fit for the market at from four to five months of age.

The utmost care should be taken at marking time to see that the operation is scientifically and cleanly done. The ideal time for marking, where fat lambs are in question, is from a fortnight to three weeks after birth. This gives the lambs every chance to recover and make good the loss entailed in the operation before marketing time.

Utility Sheep.

The Border Leicester-Merino ewe cross lamb is very attractive, being in every way suitable for the trade.

The Corriedale is by many Merino men regarded with some doubt on the ground of his purity. I am not one of those, maintaining that the breed may be regarded as fixed and thus able to reproduce his type. Personally, I regard the Corriedale as a very fine farmer's general utility sheep. He grows a very useful fleece of about 56 count, and crosses with the Merino splendidly.

I think it may be well here to explain what is meant by wool men when talking of a ''count'' with regard to wool. The simplest way to put it is to say that a ''count'' in the trade equals a hank. A hank is 560 yards long. A count of, say, 60 multiplied by 560 represents the length of single fibre of wool which can be spun from 1 lb., thus:—

1 lb. wool 60 count.
60 x 560 = 33,600 yards.

The Lincoln sire crossed with the big-framed Merino ewe produces a fine early maturing lamb of great size and weight. The wool cross, too, is not a bad one.

For districts where the rainfall is fairly sure and over 40 inches, especially if the country is low-lying, I am a strong advocate for the Romney Marsh-Merino cross. This sheep in swampy country will literally live and do well where others may be a total failure. The Romney grows a nice bright fleece with more character than the Lincoln, and from a wool point of view crosses splendidly with the Merino. However, the fact should never be lost sight of that in the matter of fat lambs the wool is a secondary consideration.

A cross very popular in parts of South Australia and Victoria is the Shropshire-Merino cross. The resulting lamb from this cross is exceptionally well shaped, and as they say in the trade ''the leg sits well on a dish and does not hang over.'' The wool from the Shrop-Merino cross, however, is not to be highly recommended, being coarse and generally of low value.

Many breeders in the Southern States advocate the use of crossbred ewes mated with a purebred ram, say, Lincoln Merino cross ewe-Lincoln ram, thus giving a three-quarter bred Lincoln lamb. This plan certainly gives a very early maturing lamb, but the difficulty in Queensland is to obtain the good direct cross ewes.

On the whole, taking all things into consideration, and with the material at hand, I would advise the Queensland farmer to start off with the big, roomy, strong-woolled Merino ewe. From this start the farmer may, should he so desire, keep back his ewe lambs for future use in his business. This plan, however, entails weary waiting and the use of more country than the farmer can usually afford.

The better plan, I think, is for the farmer to start off with the Merino ewes indicated, and, when satisfied that they have served their purpose and are becoming unprofitable, to put them on the cultivation, fatten, and sell, buying more ewes of the type required to carry on the business.

Local Conditions.

To return to the sire to be mated with the ewes, many offer, and all have their points. The choice, therefore, should be greatly governed by the class of country and the rainfall generally recorded. For the Darling Downs I recommend the Border Leicester, or the Lincoln, or a Downs breed. All throw early maturing lambs.

Marketing.

It is absolutely essential, if top prices are to be obtained, that the lambs should arrive at the market or at the freezing works with the bloom on them. To achieve this object a very good plan—and one not generally practised in Queensland—is to drive the ewes with the lambs to the trucking yards and do the drafting there. The lambs then arrive at their destination right off the teat, and no great hardship is inflicted on the ewes.

Prospects of the Industry.

With the opening of the Dawson Valley country a good opportunity should present itself to the occupiers of those lands if they are carefully guided and advised in the matter of fat lamb raising, either for the local market or the overseas trade.

A good opportunity also exists for the farmers on the Atherton Tableland, both in the matter of fat lambs and wethers. In many cases it is a common occurrence for fat sheep to come in from the West to the Brisbane market and to be retrucked far away up North to satisfy the desire for mutton.

WEEDS OF QUEENSLAND.

BINDWEED (*Convolvulus arvensis*).

By C. T. WHITE, Government Botanist.

Description.—A slender twiner with long, creeping, white, underground stems any part of which broken off may form a new plant. Leaves alternate on slender stalks of about half an inch, the leaf itself (blade) halbert-shaped with backward pointing lobes at the base or a few of the lower ones more elliptic in outline and without any basal lobes, mostly about an inch long. Flowers white or pink (white on the only Queensland ones seen), bell or broadly funnel shaped, half to an inch across, borne either single or in pairs on a slender stalk (peduncle) in the leaf-axils, the peduncle bearing a couple of minute bracts about two-thirds of the way up. Capsules globular, 2-celled and mostly 4-seeded; seeds dark brown or dull black, irregularly pear-shaped with one side more or less flat, the other rounded, about ⅛ inch long, the surface roughened with minute but prominent asperities.

Distribution.—A native of Europe now naturalised as a weed in most temperate countries (North America, Australia, New Zealand, &c.). In Queensland so far confined to the Darling Downs.

Common Names.—Bindweed or Field Bindweed are the commonest English names. Bell Bind, Cow Bind, and small-flowered Convolvulus or Morning Glory are other names sometimes given it. In Queensland the term Bell Vine or Bell Bind is generally applied to an allied plant—*Ipomaea plebeia,* somewhat of a pest in a few places, especially in the Lockyer district.

Botanical Name.—*Convolvulus* from the Latin *convolvo* (*volvi, volutum*) to roll round or entwine; *arvensis* from the Latin *arvum* a ploughed or sown field, in botany mostly used as a specific name of weeds of arable land.

Properties.—Not known to be poisonous or harmful in any way, nor on the other hand to have any economic value.

Eradication.—The Bindweed is one of the worst weed pests so far introduced on to the Downs, and farmers should eradicate it as far as possible on its first appearance. At present it seems to be confined to a few isolated patches but will undoubtedly increase once it gets a fair hold. It produces a large number of underground-running roots. Any part of these roots which is cut by a fork or plough forms a new plant. If the patch is only a small one it is probably better not to disturb the ground but to cut the young shoots and green portion down as they appear. If this is done regularly for a time the underground parts should become exhausted. A weak arsenical solution poured into the patch could be tried, and with this type of plant it may be mentioned that it is generally better to use a large amount of rather weak solution than a small amount of strong. If it is decided to fork the plant out, care should be taken that the underground roots are not carried about the farm and dropped here and there. The weed is a very bad one in Canada and parts of the United States, and the United States Department of Agriculture has issued a cyclostyled circular dealing with its eradication. This says: "The character which makes bindweed so pernicious is the possession of deep-running underground parts from which new plants arise. Even a small piece of the underground growth may develop into a new plant. Care should always be exercised to avoid scattering pieces of bindweed by means of ploughs, cultivators, &c."

Any method for the eradication of bindweed must aim to destroy the underground growth, either by direct removal, which is usually impracticable, by chemical means, or by starvation by means of constantly removing the aboveground green growth. The best methods are:—

(1) *Salting.*—The important feature in controlling bindweed is to eradicate the small patches which first appear in the field. Unless such patches are eradicated, the plant will eventually spread over the entire farm, oftentimes rendering the land valueless. The best method of eradicating patches of bindweed is to apply dry salt at the rate of from ½ to 1 lb. of salt per square foot. If any bindweed plants survive, they should be treated to a second application of salt. The salt kills the bindweed, and makes the soil unproductive for several seasons thereafter, but barren spots in the field are far more desirable than centres of bindweed infestation.

(2) *Cultivation.*—Plant corn or any other clean-cultivated crop in check-rows. Cultivate throughout the growing season of the weed at least every ten days, preferably using the knife or sweep type of cultivator, or, in case these are not

available, use the disc cultivator but never the toothed cultivator. It may be necessary to go over the hills with the handhoe following such cultivation. Two years of this procedure should completely starve out the weed. It is well to follow the next season with a shade crop, such as buckwheat, millet, soy beans, sorghum, alfalfa, or lucerne.

(3) *Fallowing.*—Allow the land to remain fallow for an entire season, clean-cultivating at intervals of about ten days. Two seasons may be necessary to secure complete eradication. Experimental results in western Kansas indicate that large areas of bindweed can be practically eradicated by fallowing the infected land intensively for an entire season, followed by sorghum the next season. A single crop of sorghum thus secured was as heavy as the combined crops for the same period of time on land continuously in sorghum. Sorghum alone did not eradicate the weed.

SUGGESTIONS.

Alfalfa, because of its excellent smothering effect and the frequent cutting this crop receives, is one of the best all-round means of controlling bindweed in sections where alfalfa grows well. Cowpeas, sorghum, millet, soy beans, and buckwheat are also useful as smothering crops, but are rarely as successful as alfalfa. It is well to follow alfalfa with a clean-cultivated crop, such as corn.

Pigs are fond of both the underground and aboveground growth of bindweed. If the land is ploughed it will greatly assist the pigs in removing the underground parts. Sheep pasturing has been found helpful, but is not as useful a method as hog pasturing. Grazing helps to hold bindweed in check, but cannot be depended upon to secure eradication.

The use of chemicals other than salt against bindweed has not been successful except under special conditions, and is not recommended.

Care should be exercised to prevent the introduction of the pest by means of (1) impure seed, especially impure wheat seed, (2) manure—bindweed seed may be contained in the droppings or may enter manure by the addition of bedding containing bindweed seeds—and (3) thrashing outfits—thrashing machines, unless thoroughly cleaned, may carry seeds of bindweed from farm to farm.

Botanical Reference.—Convolvulus arvensis linnaeus Species Plantarum 153. 1753.

WHEN PASTURE FAILS—A WINTER FODDER REMINDER.

No artificial food can compete in cheapness with natural grass, but to rely entirely on pasture is to fail in obtaining the principal advantages from such pastures. The planting of fodder crops to supplement the supply of food afforded by pastures is a wise precaution whatever the district.

In advancing some reasons for the practice on coastal country, an instructor of the New South Wales Department of Agriculture points out that the paspalum pastures make excellent growth during the favourable summer months, but that they do not make much growth during the autumn and winter. Every dairy farmer has experienced the rapid increase in production with the flush of young grass in the spring, and has also experienced the falling off in the autumn whilst there was still an abundance of feed. The rapid increase in the spring is due to the high protein content of the young grass, which equals many of our valuable concentrates. As the grass grows and becomes coarse the protein content becomes very low, with the result that the old grass in the autumn, though abundant, is of poor feeding value. By piecing out the failing grass with green fodder crops, stock can be assured of that amount of feed required to maintain them in a state of greatest efficiency.

Once an animal becomes reduced in flesh, let the owner attempt to bring it up again to its condition of greatest usefulness as a producer, and he will have brought home to him how great his loss has been through sparing the feed. Other things being equal, the animal that consumes the greatest amount of feed gives the best return. It is also clear that if an animal gets only sufficient food for bare subsistence, the farmer gets nothing in return for his feeding. It is the amount in excess of the vital demands of the animal that is devoted by it to the formation of the product, its yield of which is the reason for its place on the farm.

RURAL LIFE IN OTHER LANDS—XII.

By the EDITOR.*

MARKET MEMORIES.

FROM the dawn of civilisation man has always wanted to sell a surplus of the things he produced, whether by a system of exchange, barter, or bargaining. Even among primitive peoples like our own aboriginals some system of inter-tribal trade operates. For instance, long before the coming of the white man to this country there were regular trade routes from one part of the continent to another. Sandalwood, pituri, and pigments for corroboees were, among other substances or commodities, the subjects of barter or exchange.

A Village Market in France.

The scene on pig day in any of the smaller Queensland towns gives some idea of market day in some of the little villages of Europe. There one may see in operation the age-old human activity—as old as agriculture itself—of bartering and bargaining the products of soil and toil.

I remember such a scene at the little old-world French village of Fauquenberques, a quaint little hamlet hidden in the fold of the open chalk downs country back of Hazebrouck, towards the channel coast. From early morning the country people, mostly shod with wooden sabots, had been clattering along the roads to town carrying their produce to market. The older women had retained their quaint peasant costume of stiff linen poke bonnets and other frills and furbelows, and, walking with them, similarly burdened, were the younger women and girls arrayed in short frocks of modern fashion, silk stockings, high-heeled shoes, and other appurtenances of up-to-date flapperdom. The contrast in costumes was most striking, and illustrated, as nothing else could do so effectively, changing times and changing country customs in the old world. The sabots worn by the older women, and the last thing in footwear by their daughters, together with the marked differences in headgear, illustrated the old and the new, the emancipation of the peasant woman, and, if you like, the revolt of modern youth.

The market square in the village soon became a scene of bustling activity. Stalls and booths were erected, and through the whole of the morning the huckstering and the bargaining, the buying and selling went on. The cattle of course were not yarded as at a Queensland sale, but were tethered to any handy post. Around the pig and other small live stock pens most of the men congregated. They were all dressed for the day in their Sunday best, but in their judgment of values, their keen scrutiny of the lots offering, their sage remarks and humorous asides and arguments with the salesman, they were very much like a crowd of farmers the world over. At times one could almost persuade himself that he was back home at a Queensland pig sale. It only wanted a few of the crowd to appear in beaver moles and "Jacky Howe" shirts to complete the parallel; the illusion was only momentary, however, for one could hardly associate rusty black swallow-tail coats and "boxer" hats with a pig sale in, say, Nanango.

A Dutch Cheese Market.

A Dutch cheese market was altogether different, the local customs and conditions, of course, having no points of resemblance. I am speaking of the regular cheese market at Alkmaar, a town in Holland of about 20,000 people, and within about an hour's run by rail from Amsterdam. From the guide book one learnt that its successful resistance to besieging Spaniards, something like three and a-half centuries ago, was one of many heroic episodes in the long fight for national independence. The long twilights there, by the way, as in other parts of Northern Europe were astonishing to an Australian. There one could read a newspaper easily by daylight at ten o'clock. Up in the far north of Scotland one had the same almost uncanny experience of reading by daylight at an hour when home in Queensland one would usually be well into the land of dreams.

At Alkmaar the cheese is delivered by canal on clumsy-looking barges. Looking down into the hold of any of these water wagons one saw shelves piled high with yellow balls of cheese. The method of discharging the cargo was interesting. A man in the boat tossed two cheeses at a time to a mate on shore, who caught them with the ease and grace of Tommy Gorman accepting a pass from the base of a scrum. The cheese balls evidently stand a good deal of knocking about. On the canal side they were laid two deep in long, broad rows and covered with a cloth. Cheese was also brought in by carts and trucks, but the boats got the bulk of the traffic.

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* In a Radio Talk through 4QG.

By the following morning there was at least an acre covered with globular cheeses laid two deep in rows. There seemed enough cheese to feed the world. By nine o'clock buyers were swarming all over the place, men in pants that seemed the forerunner of the widest Oxford bags and otherwise assortedly clad. Each was armed with a butter tester, and throwing back the covering cloth, he picked up a cheese, squeezed it and stabbed it with the tester. He did not taste the cheese, however, merely crumpled it between his thumb and fingers.

When a bargain was struck the principals shook each other's hand most effusively and then porters and weighmen came on the scene. The porters were clad all in white and wore straw hats decked out with ribbons of different colours—each colour on each hat denoting the union or guild to which its wearer belonged. Leather gear over the shoulders was hooked to the handles of long wooden crates, one man in front and another behind, like a military stretcher-bearer. The crated load was then carried into a weighing room where it was placed on a huge set of scales. The weighman, also in the uniform of his union, juggled big iron weights and placed them on the scale until the beam was level. The weight of the load was marked on one of the cheeses with what looked like red raddle or paint. The load was then taken out for delivery. The men carried the load at a stiff-legged trot calling in chorus for the crowd to clear the gangway.

Though the methods seemed rather primitive, the whole market was quickly cleared, and by about eleven o'clock it was almost empty. Export cheese, it was noted, was given a red coat of some substance which, it was said, preserves it in transit.

Holland exports yearly about 80,000 tons of cheese, valued at somewhere about £7,000,000. Dutch exports of butter amount to almost as much, and of milk, either fresh, condensed, or powdered, to about £5,000,000. Hollanders also have established a large business in other dairy products, and well over half a million of Dutch people depend directly on the cow for a living.

It was the Dutch farmer himself, working through his co-operative associations, without waiting for or asking Government assistance, who put the first firm underpinning to the structure of a vast dairying industry in his own country.

Every cheese that is sent to market anywhere in Holland bears an ingenious paper stamp, containing letters, figures, and other symbols, and a statement that means its manufacture and sale is under the supervision of an organisation called the Netherland Cheese Control. By this label every cheese can be traced, if desired, right back to its maker.

[TO BE CONTINUED.]

COLOURATION CHANGES IN BUTTER.

There is a tendency with all stored butter to become deeper in colour on its surface.

The deepening of the surface colour is due to the evaporation of moisture from the surface, which diminishes the number of water droplets, and therefore permits the rays of light to reveal more nearly the natural colour of the butter fat at the surface of the butter.

The deepening of colour in the butter surface is more pronounced in unsalted butter than in butter which is salted in the usual factory procedure.

In salted butter the variation is not so marked. This is due to the affinity of salt for water. As the surface water of the butter evaporates the salt remains, and it draws fresh moisture from surrounding portions of the butter mass, thereby maintaining a more uniform moisture content throughout the butter.

The size of the butter grain and size of the water droplets incorporated in the matter mass has an influence on the uniformity of colour.

Butter manufactured under modern factory conditions, in which the water is thoroughly incorporated in the form of minute droplets, tends to impart stable uniform colour.

REFUSE AS PIG FOOD.

By E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

An inquirer asks whether waste bread, stale and burnt cakes and pastry and bakery sweepings generally would be an economic food for pigs and worth buying. He also inquires if waste fruit and vegetables from the markets are good feeding stuffs. In reply we would advise the principal difficulty with all waste food products is to determine at what stage they become risky and detrimental. It is hard to place a commercial value on such products, for musty and mouldy cereal products are liable to cause serious digestive disorders, while rotten fruit and decayed vegetable matter may cause sever gastric trouble and even enteritis.

Similarly, there is invariably a good deal of variation in the quality of these products, and bakery and mill sweepings often contain numerous short pieces of string and bagging, paper, mud and dust, and other foreign matter.

I have often seen mill offal sold at 1s. per bag. This offal was not worth even the price of the containers, for the bags were old second-hands and were mostly useless. The "offal" contained hundreds of dead mice and rats, any amount of waste paper and rubbish, musty and mouldy grain, &c., and was distinctly a dangerous food to use, even when boiled. However, apart from all this, clean, dry, and wholesome stale bread, and burnt cakes, &c., are both economical and useful additions to the daily rations of pigs, so are broken biscuits, biscuit meal, &c. These products are best soaked in hot milk or water for some hours before use, but there is no occasion to boil or cook them. The foods recommended for use in conjunction with these include barley meal, maize meal, milk, pollard, greenstuffs, mineral matters, and drinking water. The purchase price of waste bread, cakes, &c. is difficult to determine; 1s. per bag is too much if there is any musty or mouldy stuff included. Possibly if these foods were valued at less than half the price of, say, pollard, it would give a lead in arriving at a valuation, which would indicate that at about £3 per ton or so they would be economical. Their chemical analysis is equally difficult to arrive at, but they are mostly fattening foods and usually carry a fairly high sugar content.

Waste Fruit.

Of waste fruit it could be said that in general it has a very low commercial value as pig food, and if cartage, bags, or cases are charged for it is doubtful if it could be used economically. Pigs will certainly eat waste fruit and appreciate same, but if it has to be paid for and if payment has to be based on quantity it would be well left alone, unless arrangements could be made for delivery at a very low rate, not including cost of cases or cartage.

To the farmer who has waste fruit and who has no other use for this than as pig food, the product can be utilised to advantage, and when balanced with concentrated meals, &c., it is well worth while; but to have a fruit merchant telephone or advise that he has 500 cases of inferior fruit for immediate sale as pig food at 1s. per case, plus cartage costs, say, 1s. per case, the fruit at 2s. per case, inclusive of all decayed, overheated, or otherwise unsuitable material, is not an attractive proposition, and serious consideration should be given to the matter before a decision is arrived at.

It seems unfortunate that this is the case, but it is so, and unless one has sufficient well-grown and developed pigs to consume the fruit to advantage there would be no profit in the transaction, and probably it would result in loss. Much the same may be said in regard to the tons of cabbage leaves, turnip tops, &c., that are carted away from vegetable markets annually. This class of food is quite good if spread over a grazing area where pigs can pick it up at their leisure as a sort of afternoon snack, but if it has to be paid for in hard cash it is difficult to decide on a commercial value that would be payable to both parties.

The stomachs of very young pigs cannot absorb these foods to the same advantage as can breeding sows, hence waste fruit and the like should not be given to young stock; they should have nothing but the very best of milk, meal, &c., plus greenstuff and minerals. Anything likely to cause gastric disorders is distinctly dangerous to young pigs, and equally so to older stock if it is in an advanced state of decomposition.

Pigs that are accustomed to swill food, waste bread, meat, vegetables, fruit, &c., will grow very much better on this food than where the diet is suddenly changed from, say, milk and meat to a day or two's entire diet of waste fruit, vegetable leaves, &c.

In all cases the pig troughs and feeding floors should be regularly and efficiently cleaned of all accumulations of left-over food, and this waste matter should be burnt or buried, for when it becomes rancid, sour, or highly decomposed it is decidedly dangerous.

In every instance pigs fed on waste food of this description should have ample supplies of drinking water, and all putrescible food should be thoroughly cooked before use to avoid the risks associated with feeding stuff in a raw condition.

SCHOOL OF INSTRUCTION TO PIG FARMERS AT GATTON COLLEGE.

9th to 19th JUNE, 1930.

Attention is called to the annual school of instruction to pig farmers to be held at the Gatton College during the period 9th to 19th June, 1930. These schools have been organised to provide the means whereby farmers, their sons and daughters, desirous of improving their knowledge of pig raising, may come together at a convenient centre for the purpose of meeting one another and of attending practical demonstrations and lecturettes, indoor studies, &c., on every phase of pig raising.

As early application is necessary, it would be well for those interested to get in touch with the Principal of the College so that arrangements may be made in ample time before the date the school opens.

Professor Murray advises that there need be no fear on the part of the farming community with regard to attendance at this school of members of their families, for provision has been made for accommodation, meals, &c., and those attending can be assured their personal wants will not be overlooked. The social side of the life of these schools is a special feature, while before the lecture session begins opportunity is afforded for a free and easy hour for questions and answers, during which questions relative to any branch of agriculture may be asked. At these sessions officers attend who are interested with other branches of college life, such as the Plant Breeder and the Horticulturalist; in fact, question time is one of the most interesting periods of the day for those interested in orcharding, dairying, &c., as well as pig raising.

The evening cinematograph and lantern lectures are also of much interest and value and are much appreciated. As opportunity offers, prominent authorities on agriculture, apart from departmental officials, give addresses.

An added attraction in the school programme is a visit of inspection to bacon factories, for here the various operations associated with the manufacture of pork products are in full swing. Apart from the educational advantages of such a trip, the day's outing is looked forward to with a great deal of interest by those fortunate enough to attend.

The school fees are exceptionally reasonable (£3 8s. 6d. for the fortnight, covering all expenses), and concession fares on the railways are available to those attending. Further particulars may be obtained by writing to the Principal, Queensland Agricultural High School and College, T.P.O., South Gatton, or from the Department of Agriculture and Stock, Brisbane, Queensland.

It might be mentioned that at the College piggery more than 300 pigs are kept. These comprise representatives of the various breeds in Queensland, and they are bred for stud purposes as well as for the production of pork and bacon. An extensive series of experiments in the breeding of pigs has recently been added to the activities of the pig section. These experiments are under the control of the Departments of Public Instruction and Agriculture and Stock, and of the Queensland Pig Industry Committee as representing the various bacon factories.

Considerable interest is being displayed in the results of crossing the various breeds together, and this section should be of considerable interest to those attending the Pig Farmers' School. Several lecturettes will be arranged to indicate just what is being done, for the objective is to test out under farm conditions prolificacy, suitability, early maturity, and economy of production of various types of pigs. The pig section, therefore, is of the greatest educational value, and one in which farmers generally will be interested.

STOCK LICKS AND MINERAL FEEDS REGISTERED FOR 1930.

By FRED. F. COLEMAN, Officer-in-charge Seeds, Stock Foods, Fertilisers, and Pest Destroyers Branch, Department of Agriculture and Stock,

Under the Stock Foods Acts it is provided that the seller must affix to every package a plainly printed label which must clearly certify in the case of stock licks or mineral feeds—

The number of net pounds in the package ;

The distinguishing name or trade mark of the material ;

The name and principal address of the Queensland wholesale seller ; and

The chemical analysis expressed in the following manner :—

The minimum percentage of phosphoric acid (P_2O_5) and the name of the material from which it is derived ;

The minimum percentage of lime when such material has been added ;

The minimum percentage of magnesia, which can best be expressed by giving the actual percentage by weight of the magnesium sulphate present ;

The minimum percentage of iron and the form in which it occurs. This can best be expressed by giving the actual percentage by weight of the material in the form of, say, iron sulphate or iron carbonate ;

The minimum percentage of sulphur as flowers of sulphur or as ground sulphur ;

The maximum percentage of salt (sodium chloride).

Where potassium iodide has been added to the mixture, the number of ounces that would be in one ton.

In all stock licks or mineral feeds to which any mixed, concentrated, or prepared stock food or prescribed by-product has been added, the percentage by weight of such added stock food must be expressed on the label. In other words, if the ingredients of the stock lick include molasses, peanut meal, cocoa meal, bran, or other by-products, the percentage of such material must appear on the label.

The label is also required to give the specific name of each of the original materials or ingredients and the proportion or amount of the foreign ingredients.

It is now provided that bone meal, bone dust, or bone flour under whatever name sold for use in stock licks or for feeding purposes must only be made from bones obtained from animals slaughtered for human consumption, and shall be subjected for at least two hours to a steam heat at a temperature of not less than 250 deg. Fahr., equal to an indicated steam pressure of 30 lb. per square inch, and then ground to such fineness as will permit of all passing through an aperture of one-sixteenth of an inch, and at least 95 per cent. through an aperture of one-twenty-fifth of an inch.

Nauru or Ocean Island phosphate is defined as a mineral phosphate from Nauru or Ocean Island containing not less than 37 per cent. of phosphoric acid (P_2O_5), and ground to such fineness as will permit of all passing through an aperture of one-fortieth of an inch, and at least 95 per cent. through an aperture of one-hundredth of an inch.

The stock licks and mineral feeds registered for the current year are as follows:—

STOCK LICKS AND MINERAL FEEDS.

REGISTERED DURING JANUARY, FEBRUARY, MARCH, 1930, FOR THE YEAR ENDING 31ST DECEMBER, 1930.

Queensland Wholesale Dealer.	Sold under the Name of—	Dealer's Guarantee.		Composed of or Manufactured from—
		Minimum Phosphoric Acid P_2O_5.	Maximum Salt.	
A.C.F. and Shirley's Fertilizers, Ltd., Roma street, Brisbane	Kwik-Lik	14·0	45·0	Ground rock phosphate, sterilised bone meal, salt, magnesium sulphate, flowers of sulphur, sulphate of iron, and molasses
Australian Disinfectant Co., Albert street, Brisbane	Wagstaff's Medicated Stock Salt	..	90·0	Salt, flowers of sulphur, molasses, soda bicarbonate, aloes, flavouring matter, a trace of iron, 4 per cent. of bran, and contains 20 oz. of potassium iodide to the ton
Thos. Borthwick and Sons (Aust.), Ltd., Wharf st., Brisbane	Borthwick's Bomo Poultry Tonic	12·0	35·0	Sterilised bone meal, lime, salt, powdered sulphur, iron, magnesium sulphate, and contains 1½ oz. potassium iodide per 100 lb.
Ditto	Moreton Bonolik for Stock ..	12·0	45·0	Sterilised bone meal, salt, powdered sulphur, iron, magnesium sulphate, and contains 1½ oz. potassium iodide per 100 lb.
Ditto	Moreton Salbolik	8·0	66·0	Sterilised bone meal and salt
Brabant and Co., Charlotte st., Brisbane	Brablick	14·0	42·0	Sterilised bone meal, fine Nauru phosphate, salt, flowers of sulphur, sulphate of iron, magnesium sulphate, molasses, and contains 14 oz. potassium iodide to the ton
Buzacott's (Qld.), Ltd., Adelaide st., Brisbane	"Lix-all" Vitality Stock Lick	10.0	50·0	Salt, bone char, sulphur, sulphate of iron, magnesium sulphate, molasses, 4 per cent. of wheat by-products, and contains 2 oz. potassium iodide to the ton
Dalgety and Co., Ltd., Elizabeth st., Brisbane	Dalco Stock Lick I.	16·5	35·0	Ground rock phosphate, sterilised bone meal, salt, magnesium sulphate, flowers of sulphur, sulphate of iron, molasses, and contains 16 oz. potassium iodide to the ton
Ditto	Prophylactic Blue Cross Stock Lick	..	83·0	Salt, sulphur, magnesium sulphate, ferrous sulphate, sodium bicarbonate, calcium sulphate, and molasses
Denhams Ltd., Roma st., Brisbane	Iodolik—Mineral Supplement for Sheep—Concentrate	24·0	..	Sterilised bone meal, Nauru phosphate, magnesium sulphate, sulphate of iron, flowers of sulphur, peanut meal, molasses, and contains 30 oz. potassium iodide to the ton
Ditto	Iodolik—Mineral Supplement for Sheep—Dry Grass Formula	13·0	30·0	Sterilised bone meal, Nauru phosphate, salt, magnesium sulphate, sulphate of iron, flowers of sulphur, peanut meal, molasses, and contains 20 oz. potassium iodide to the ton
Ditto	Iodolik—Mineral Supplement for Sheep—Green Grass Formula	17·0	32·5	Sterilised bone meal, Nauru phosphate, salt, magnesium sulphate, sulphate of iron, flowers of sulphur, peanut meal, molasses, and contains 20 oz. potassium iodide to the ton
Ditto	Iodolik—Mineral Supplement for Cattle	16·0	32·5	Sterilised bone meal, Nauru phosphate, salt, magnesium sulphate, sulphate of iron, flowers of sulphur, peanut meal, molasses, and contains 20 oz. potassium iodide to the ton
Ditto	Iodolik—Mineral Supplement for Pigs	12·0	15·0	Sterilised bone meal, Nauru phosphate, carbonate of lime, magnesium sulphate, sodium sulphate, flowers of sulphur, sulphate of iron, bicarbonate of soda, salt, charcoal, meat meal, and contains 20 oz. potassium iodide to the ton
A. Victor Leggo and Co., 72 Albert st., Brisbane	Vigoreen (already mixed) for Sheep	1·8	85·0	Salt, whiting, di-calcium phosphate, magnesium sulphate, iron sulphate, ground sulphur, and contains 7 oz. potassium iodide to the ton
Ditto	Vigoreen (Concentrated) ..	10·9	15·0	Salt, whiting, di-calcium phosphate, magnesium sulphate, iron sulphate, ground sulphur, and contains 43 oz. potassium iodide to the ton
Ditto	Dairy Vigoreen	11·5	32·0	Salt, whiting, di-calcium phosphate, magnesium sulphate, iron sulphate, ground sulphur, and contains 7 oz. potassium iodide to the ton
Ditto	Pig Vigoreen	7·3	17·0	Salt, whiting, di-calcium phosphate, magnesium sulphate, iron sulphate, ground sulphur, and contains 7 oz. potassium iodide to the ton

STOCK LICKS AND MINERAL FEEDS—*continued.*

REGISTERED DURING JANUARY, FEBRUARY, MARCH, 1930, FOR THE YEAR ENDING 31ST DECEMBER, 1930—*continued.*

Queensland Wholesale Dealer.	Sold under the Name of—	Dealer's Guarantee.		Composed of or Manufactured from—
		Minimum Phosphoric Acid P_2O_5.	Maximum Salt.	
R. B. Lawson and Co., Stanthorpe	Guyra Stock Lick	2·9	85·0	Salt, copper sulphate, Nauru phosphate, sterilised bone meal, magnesium sulphate, molasses, Stockholm tar, and contains 6 oz. potassium iodide to the ton
Mactaggart's Co-operative Association, Ltd., 64 Eagle st., Brisbane	Phospho Sheep and Cattle Lick	18·0	50·0	Nauru phosphate, salt, and contains 16 oz. potassium iodide to the ton
New Zealand Loan and Mercantile Agency Co., Eagle st., Brisbane	Cooper's Medico	..	..	Ground sulphur, iron, potassium salts, nicotine, vegetable spices, and tonics
Queensland Pastoral Supplies Ltd., Bowen st., Brisbane	Hibiscus Stock Lick	14·5	40·0	Salt, Nauru phosphate, magnesium sulphate, sulphate of iron, flowers of sulphur, and molasses
Ditto	Hibiscus Iodised Stock Lick	14·5	40·0	Salt, Nauru phosphate, magnesium sulphate, sulphate of iron, flowers of sulphur, molasses, and contains 16 oz. potassium iodide to the ton
Ditto	Hibiscus Concentrated Nutrient Stock Lick—Iodised	21·0	..	Nauru phosphate, sulphate of iron, magnesium sulphate, flowers of sulphur, molasses, 18 per cent. of cottonseed meal, and contains 16 oz. potassium iodide per 2,000 lb.
Ditto	Hibiscus Salt Lick Sulphurized	..	97·0	Salt and sulphur
Queensland Primary Producers' Co-operative Association, Ltd., Eagle st., Brisbane	"Lix-all" Vitality Stock Lick	10·0	50·0	Salt, bone char., sulphur, sulphate of iron, magnesium sulphate, molasses, 4 per cent. of wheat by-products, and contains 2 oz. potassium iodide to the ton
Webster and Co., Ltd., Mary st., Brisbane	Vita-Lick Concentrated "D"	11·7	..	Sterilised bone, superphosphate, magnesium sulphate, flowers of sulphur, sulphate of iron, 35 per cent. of rice and cocoa by-products, and contains 16 oz. potassium iodide to the ton
Ditto	Vita-Lick Concentrated "G"	18·5	..	Sterilised bone, superphosphate, magnesium sulphate, flowers of sulphur, sulphate of iron, 15 per cent. of rice and cocoa by-products, and contains 16 oz. potassium iodide to the ton
Ditto	Vita-Lick Mixed "D"	2.1	78·0	Salt, sterilised bone, superphosphate magnesium sulphate, flowers of sulphur, iron sulphate, 7 per cent. of rice and cocoa by-products, molasses, and contains 3 oz. potassium iodide to the ton
Ditto	Vita-Lick Mixed "G"	3·4	78·0	Salt, sterilised bone, superphosphate, magnesium sulphate, flowers of sulphur, iron sulphate, 3 per cent. of rice and cocoa by-products, molasses, and contains 3 oz. potassium iodide to the ton
Ditto	Special Cattle Lick Concentrated "D"	20·0	..	Sterilised bone, superphosphate, magnesium sulphate, iron sulphate, 15 per cent. of rice and cocoa by-products, and contains 16 oz. potassium iodide to the ton
Ditto	Special Cattle Lick Concentrated "G"	22·0	..	Sterilised bone, superphosphate, iron sulphate, 15 per cent. of rice and cocoa by-products, and contains 16 oz. potassium iodide to the ton
Ditto	Carbofos Medicated Blocks (black)	2·7	82·0	Salt, superphosphate, Nauru phosphate, calcium hydrate, sterilised bone, iron sulphate, and magnesium sulphate
Ditto	Vita-Lick Medicated Blocks (white)	1·5	86·0	Salt, superphosphate, Nauru phosphate, calcium hydrate, iron sulphate, and magnesium sulphate
Ditto	Por-Co-Vite	12·0	35·0	Salt, sterilised bone, carbonate of lime, flowers of sulphur, iron sulphate, magnesium sulphate, and contains 46 oz. potassium iodide to the ton
Ditto	Chic-A-Vite	19·0	..	Sterilised bone, superphosphate, magnesium sulphate, sulphate of iron, flowers of sulphur, 15 per cent. of peanut meal and rice by-products, and contains 16 oz. potassium iodide to the ton

STOCK LICKS AND MINERAL FEEDS—*continued.*

Registered during January, February, March 1930, for the Year ending 31st December, 1930—*continued.*

Queensland Wholesale Dealer.	Sold under the Name of—	Dealer's Guarantee.		Composed of or Manufactured from—
		Minimum Phosphoric Acid P_2O_5.	Minimum Crude Protein.	
STERILISED BONE MEAL AND FINELY-GROUND NAURU PHOSPHATES.				
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	Gladstone Sterilised Bone Meal	28·0	17·0	Sterilised bones
Ditto	Zillmere Sterilised Bone Meal	24·0	22·0	ditto
Thos. Borthwick and Sons (Aust.), Ltd., Wharf st., Brisbane	Borthwick's Sterilised Bone Meal	24·0	24·0	ditto
The Poultry Farmers' Co-operative Society, Ltd., Roma st., Brisbane	"Red Comb" Sterilised Bone Meal	24·0	22·0	ditto
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	Shirley's Finely Ground Nauru Phosphate Rock	37·0	..	Nauru and Ocean Island phosphate rock

Brisbane, 31st March, 1930.

FERTILISERS REGISTERED FOR 1930.

By FRED. F. COLEMAN, Officer-in-charge Seeds, Stock Foods, Fertilisers, and Pest Destroyers Branch, Department of Agriculture and Stock,

Under "*The Fertilisers Acts,* 1914 *to* 1916" it is provided that every person who desires to sell fertilisers should before selling or on or before the 31st day of January in each year, fill in an application for license form and enclose therewith the prescribed fee of £1 1s., sending same to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Licenses under the Fertilisers Acts remain in force until the thirty-first day of December of the year of issue.

On or before the thirty-first day of January in each year, every licensed dealer is required to fill in and forward to the Under Secretary, or Officer appointed for that purpose, a Certificate of Registration of Fertilisers, setting out the ingredients of each brand of fertiliser that he is selling or proposes to sell, and the percentage of nitrogen, phosphoric acid, potash, and the forms in which these ingredients respectively occur

On the sale of any fertiliser, the licensed dealer must at the time of sale, or before delivery, give the buyer an invoice certificate.

The invoice certificate should be in the form prescribed by the Acts, and is required to set out the name of the licensed dealer, the name of the purchaser, the weight sold, name of fertiliser, including brands or trade mark if such appear on the bags; also, the chemical analysis stating the percentage of nitrogen, phosphoric acid, potash, and the forms in which they respectively occur. In the case of bone dust, meatworks fertiliser, and Nauru phosphate, the percentage of fine and coarse material must be declared.

Every bag of fertiliser sold must have attached thereto a plainly printed label clearly and truly certifying—

(*a*) The number of net pounds of fertiliser in the bag;

(*b*) The figure, trade mark, or other sign under which the fertiliser is sold;

(*c*) The chemical analysis, stating the percentage of nitrogen, phosphoric acid, and potash, and the forms in which they respectively occur, and the percentage of fine and coarse material, &c., as required by the invoice certificate.

It will, therefore, be noted that the only material difference between the invoice certificate and the printed label is that in the former the total weight of the fertiliser is stated, and in the latter the net number of pounds in the bag to which the label is attached.

The invoice certificate must agree with the Certificate of Registration forwarded to the Department of Agriculture.

A producer within the meaning of the Regulations is—

> "Any licensed dealer who, whether as manufacturer, importer, or wholesale dealer, is primarily responsible for putting on the Queensland market any fertiliser, and in the case of a producer whose place of business is not within the State of Queensland, the agent of such producer who is resident in Queensland.

Every producer of fertiliser is required to forward a schedule setting out the following particulars:—

(1) The brand under which the fertiliser is known;

(2) The price per ton of the fertiliser, free on rail at Queensland works, or at Brisbane;

(3) The name and address of the manufacturer or importer of the fertiliser;

(4) The place of manufacture; and

(5) The raw materials from which the fertiliser is manufactured or prepared; and if the fertiliser contains mineral rock phosphate, Nauru phosphate, or any organic material such as leather, hoof, horn, hair, wool, waste, peat, garbage, tankage, or similar material, the percentage by weight thereof, and a statement as to the treatment or process (if any) to which the organic material has been subjected.

Producers of fertilisers are also required to furnish to the Under Secretary or other officer appointed for the purpose, a specimen of the printed label for each fertiliser registered.

It is frequently overlooked that a fertiliser is any substance or compound, produced, or prepared in any manner for *fertilising the soil or supplying nutriment to plants,* also any excrement of animals or any natural substance or natural product which is used for fertilising the soil or supplying nutriment to plants. It will, therefore, be noted that any soil or any natural substance or natural product *claimed to supply nutriment to plants comes under the Fertilisers Acts* and is required to be labelled setting out the percentages of nitrogen, phosphoric acid, and potash.

Cases are on record of soil, sludge, and incinerated town refuse being sold and claimed to be worth from 35s. to £5 per ton at seller's station. The material on analysis was found to vary in value from 10s. 9d. to just over £1. Taking the cost of bags into account and the railway freight on ton lots, it is obvious that such material is not worth the cost of transit.

Recently it was found that quite a large trade was being carried on in the Brisbane suburbs and at Ipswich with material claimed by the vendors to contain secret ingredients. On examination of samples and inspection of the premises it was found that the material principally consisted of stable manure, soil, sawdust, road sweepings, and in one case, about 5 per cent. of an ordinary meatworks fertiliser had been added. Cases are reported from North Queensland where material, the residue products of sugar mills, had been collected and sold at prices quite out of proportion to its nitrogen content. Farmers and other buyers would be well advised never to accept delivery of any material unless it has affixed to every package a plainly printed label setting out the percentages of nitrogen, phosphoric acid, and potash, and the forms in which they occur. The buyer should also receive an invoice certificate setting out the particulars that should appear on the labels. Such certificate is the seller's guarantee as to the quality of the material. In the absence of a label or invoice certificate it is obvious that the buyer should refuse delivery.

FERTILISERS REGISTERED BY PRODUCERS DURING JANUARY, FEBRUARY, MARCH, 1930, FOR THE YEAR ENDING 31ST DECEMBER, 1930.

FERTILISERS CONTAINING NITROGEN ONLY.

Registered by the undermentioned as Producers within the meaning of the Regulations.	Name of Fertiliser.	Producers Guarantee Nitrogen as—	
		Sodium Nitrate.	Ammonium Sulphate.
	Sulphate of Ammonia.		
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	A.C.F. Sulphate of Ammonia	..	20·6
A.C.F. and Shirley's Fertilizers, Ltd., Causeway, Townsville	ditto	..	20·6
Fertiliser Distributers, Ltd., E. S. and A. Bank Chambers, Roma st., Brisbane	Sulphate of Ammonia ..	..	20·6
Webster and Co., Ltd., Mary st., Brisbane	"Crown" Brand Sulphate of Ammonia	..	20·0
	Nitrate of Soda.		
A.C.F. and Shirley's Fertilizers Ltd., Roma st., Brisbane	A.C.F. Nitrate of Soda ..	15·6	..
A.C.F. and Shirley's Fertilizers, Ltd., Causeway, Townsville	ditto	15·6	..

FERTILISERS CONTAINING PHOSPHORIC ACID ONLY.

Registered by the Undermentioned as Producers within the Meaning of the Regulations.	Name of Fertiliser.	Producers' Guarantee.				
		Phosphoric Acid.			Fineness.	
		Water Soluble.	Citrate Soluble.	From Nauru and Ocean Island Phosphate	Fine Material.	Coarse Material.
	Superphosphate.					
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	Shirley's High Grade Superphosphate	20·5	0·5	..	..	..
A.C.F. and Shirley's Fertilizers, Ltd., Causeway, Townsville	ditto	20·5	0·5	..	..	..
Fertiliser Distributers, Ltd., E. S. and A. Bank Chambers, Roma st., Brisbane	Superphosphate	20·5	0·5	..	..	..
Gibbs, Bright, and Co., Queen st., Brisbane	"Sulphide" Superphosphate	20·5	0·5	..	..	..
Webster and Co., Ltd., Mary st., Brisbane	"Crown" Brand Superphosphate	21·0	..	..	..	..
	Basic Super.					
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	Shirley's Basic Super	..	17·0	..	..	..
A.C.F. and Shirley's Fertilizers, Ltd., Causeway, Townsville	ditto	..	17·0	..	..	..
Gibbs, Bright, and Co., Queen st., Brisbane	Sulphide Basic Super	3·0	15·0	..	..	..
	Phosphate Rock.					
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	Shirley's Ground Phosphate Rock	..	..	37·0	95	5

FERTILISERS CONTAINING POTASH ONLY.

Registered by the Undermentioned as Producers within the meaning of the Regulations.	Name of Fertiliser.	Producers' Guarantee Potash as—	
		Potassium Sulphate	Potassium Chloride.
	Sulphate of Potash.		
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	A.C.F. Sulphate of Potash	48	..
A.C.F. and Shirley's Fertilizers, Ltd., Causeway, Townsville	ditto	48	..
Dalgety and Co., Ltd., Elizabeth st., Brisbane	"Stork" Brand Sulphate of Potash	48	..
Denhams Ltd., Roma st., Brisbane	Sulphate of Potash	48	..
Gibbs, Bright and Co., Queen st., Brisbane	ditto	48·5	..
Webster and Co., Ltd., Mary st., Brisbane	"Crown" Brand Sulphate of Potash	50	..
	Muriate of Potash.		
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	A.C.F. Muriate of Potash	..	50
A.C.F. and Shirley's Fertilizers, Ltd., Causeway, Townsville	ditto	..	50
Dalgety and Co., Ltd., Elizabeth st., Brisbane	"Stork" Brand Muriate of Potash	..	50
Denhams Ltd., Roma st., Brisbane	Muriate of Potash	..	50
Fertiliser Distributers, Ltd., E. S. and A. Bank Chambers, Roma st., Brisbane	ditto	..	52

Fertilisers, the Product of Bone Mills, Meatworks, and Bacon Factories.

Registered by the Undermentioned as Producers within the Meaning of the Regulations.	Name of Fertiliser.	Producers' Guarantee.				
		Nitrogen as Blood, Bone, Flesh and Offal.	Phosphoric Acid from Bone.	Fineness.		
				Fine Material.	Coarse Material.	Unspecified Material.
	Dried Blood.					
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	Dried Blood	12·0	..	76	21	3
Queensland Meat Export Co., Ltd., Mary st., Brisbane	Q.M.E. Meatworks Dried Blood (Eagle Farm)	12·0	..	56	42	2
Ditto	Q.M.E. Meatworks Dried Blood (Ross River)	12·8	..	71	27	2
Swift Australian Co., Ltd., 181 Eagle st., Brisbane	Dried Blood	12·0	..	70	20	10
Swift Australian Co., Ltd., Townsville	ditto	12·0	..	55	35	10
	Bone Dust.					
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	Normanby Bonedust ..	3·6	23·0	60	40	..
Ditto	Runcorn Bonedust ..	3·6	23·0	60	40	..
Ditto	Shirley's Bone Dust ..	3·5	23·5	70	30	..
Denhams Ltd., Roma st., Brisbane ..	Sterilised Bone Flour ..	1·0	30·0	85	15	..
Fertiliser Distributers Ltd., E. S. and A. Bank Chambers, Roma st., Brisbane	FDL Brand Vitalized Bone Meal	3·0	22·0	70	30	..
Swift Australian Co., Ltd., 181 Eagle st., Brisbane	Bone Meal	3·0	24·0	35	65	..
Swift Australian Co., Ltd., Townsville ..	ditto	3·0	24·0	35	65	..
	Blood, Bone, Flesh, and Offal.					
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	Blood and Bone	5·0	14·0	65	22	13
Thos. Borthwick and Sons (Aust.), Ltd., Wharf st., Brisbane	Brooklyn Fertilizer ..	6·6	12·1	71	24	..
Queensland Co-operative Bacon Association, Ltd., Murarrie	Atlas Brand Fertiliser..	6·5	12·2	84	14	2
Queensland Meat Export Co., Ltd., Mary st., Brisbane	Q.M.E. Meatworks Fertilizer Plain Milled (Eagle Farm)	4·6	18·9	71	23	6
Ditto	Q.M.E. Meatworks Fertilizer Mixed Milled (Eagle Farm)	6·7	13·0	44	42	14
Ditto	Q.M.E. Meatworks Fertilizer Plain Milled (Ross River)	5·8	17·2	79	19	2
Swift Australian Co., Ltd., 181 Eagle st., Brisbane	Meatworks Fertiliser ..	5·5	10·0	55	45	..
Swift Australian Co., Ltd., Townsville ..	ditto	5·0	15·0	55	45	..
Webster and Co., Ltd., Mary st., Brisbane	Crown Bone and Offal Mixture	2·7	21·0	68	30	.

MIXED FERTILISERS (MECHANICAL MIXTURES).

Registered by the Undermentioned as Producers within the Meaning of the Regulations.	Name of Fertiliser.	Producers' Guarantee.										
		Nitrogen as—		Phosphoric Acid.				Potash as—		Fineness.		
		Ammonium Sulphate.	Blood, Bone, Flesh, and Offal.	Water Soluble.	Citrate Soluble.	From Bone.	From Rock Phosphate.	Sulphate.	Chloride.	Fine Material.	Coarse Material.	Unspecified Material.
A.C.F. and Shirley's Fertilizers, Ltd., Roma st., Brisbane	A.C.F. No. 1	2·0	3·0	..	..	13·0	..	8·0	..	60	40	..
Ditto	A.C.F. No. 3	3·5	1·5	4·0	..	10·0	..	..	7·0	60	40	..
Ditto	A.C.F. B3	5·5	1·5	4·0	..	6·0	..	..	10·5	60	40	..
Ditto	A.C.F. No. 4	2·0	2·0	2·0	..	9·0	..	12·0	..	60	40	..
Ditto	A.C.F. No. 5	2·0	1·5	5·0	..	7·0	..	..	12·0	60	40	..
Ditto	A.C.F. "Three 6"	3·75	1·25	5·0	..	7·0	..	4·0	3·0	60	40	..
Ditto	A.C.F. No. 8	..	2·0	5·0	..	12·0	..	9·0	..	60	40	..
Ditto	A.C.F. Threights 8.8.8.	8·0	..	8·0	..	..	..	8·0	..	..	..	..
Ditto	A.C.F. Trinine 9.9.9.	7·6	1·4	..	..	9·0	..	9·0	..	60	40	..
Ditto	A.C.F. No. 12 (Muriate)	4·0	1·5	..	..	8·0	..	..	18·0	60	40	..
Ditto	A.C.F. Badgen Fertilizer	2·0	2·5	3·0	..	9·5	..	12·0	..	60	40	..
Ditto	A.C.F. Bone and Super.	..	1·7	11·0	..	10·0	..	..	..	60	40	..
Ditto	A.C.F. Planting Mixture	..	1·0	14·0	..	3·0	..	..	7·5	60	40	..
Ditto	A.C.F. Kwikgro	2·5	1·5	..	..	14·0	..	7·0	..	90	10	..
Ditto	Shirley's Fertilizer No. 5	3·0	..	12·0	..	..	..	7·0	..	..	..	..
Ditto	Shirley's Fertilizer Q. 5. Mixture	4·0	..	12·0	..	..	..	10·0	..	..	..	..
Ditto	Shirley's Fertilizer No. 8	4·1	..	16·4	..	..	..	..	..	..	..	..
Ditto	Shirley's Fertilizer No. 11	..	..	15·5	..	..	..	4·0	..	..	..	..
Ditto	Shirley's "Bana" Fertilizer	4·0	..	5·0	5·0	..	..	13·0	..	..	..	..
Ditto	Shirley's Howes' Mixture	9·0	..	..	6·0	..	..	11·0	..	..	..	..
Ditto	Shirley's Howes' Mixture (Meatworks Base)	6·5	2·5	..	..	7·0	..	11·0	..	71	26	3
Ditto	Shirley's "Tropic" Fertilizer	1·75	3·25	..	..	12·0	..	10·0	..	75	25	..
A.C.F. and Shirley's Fertilizers, Ltd., Causeway, Townsville	A.C.F. B. 3 Extra	6·0	1·0	3·0	..	3·4	3·6	10·0	..	80	20	..
Ditto	A.C.F. B. 3 Muriate	6·0	1·0	3·0	..	3·4	3·6	..	10·0	80	20	..
Ditto	A.C.F. B. 3 Northern	6·0	1·0	4·5	..	2·0	2·0	..	12·5	80	20	..
Ditto	A.C.F. Trinine 9.9.9.	7·4	1·6	..	..	9·0	..	..	9·0	80	20	..
Ditto	A.C.F. Bone and Super	..	1·7	11·0	..	10·0	..	..	..	60	40	..
Ditto	A.C.F. Howes' Mixture	6·5	2·5	..	..	7·0	..	11·0	..	80	20	..
Ditto	A.C.F. Howes' Mixture (with Muriate of Potash)	6·5	2·5	..	..	7·0	..	..	11·0	80	20	..
Ditto	A.C.F. Magnetic	8·0	1·0	2·0	..	2·0	2·0	12·5	..	80	20	..
Ditto	Shirley's Improved Drill Mixture	3·0	1·0	4·5	..	2·0	5·5	..	13·0	80	20	..
Ditto	Shirley's "Organik" Fertilizer	4·0	1·5	4·5	..	2·5	..	10·0	..	80	20	..

Thos. Borthwick and Sons (Aust.), Ltd., Wharf st., Brisbane	Moreton Fertilizer No. 1	..	4·6	..	..	14·4	..	9·6	..	72	24	..
Ditto	Moreton Fertilizer No. 2	..	5·3	..	..	16·2	..	4·8	..	81	15	..
Ditto	Moreton Fertilizer No. 3	2·0	3·4	3·3	..	10·6	..	7·6	..	80	17	..
Fertiliser Distributers Ltd., E. S. and A. Bank Chambers, Roma st., Brisbane	F.D.L. Mixture No. 3	2·0	1·25	2·0	..	9·5	2·0	..	4·5	80	20	..
Ditto	F.D.L. Mt. Etna No. 4 Fish	2·5	2·0	..	..	13·25	1·0	..	6·5	80	20	..
Ditto	F.D.L. Orchard Mixture No. 5	2·0	2·25	..	..	13·25	1·0	..	8·0	80	20	..
Ditto	F.D.L. Ratoon No. 6	4·5	2·0	..	..	12·25	..	..	10·0	80	20	..
Ditto	F.D.L. Mixture No. 10	7·75	1·25	..	..	7·25	..	..	11·0	80	20	..
Gibbs, Bright, and Co., Queen st., Brisbane	G.F.3. Special Fertilizer	7·0	..	9·5	0·5	..	..	10·0	..	..	..	..
Ditto	Howes' Mixture	9·0	..	6·0	..	..	..	11·0	..	..	..	..
Ditto	S.C. No. 4 Special Fertilizer	4·0	..	13·0	..	..	..	8·0	..	..	..	..
Ditto	Special A1 Cane Fertilizer	7·0	..	6·5	..	..	..	7·0	..	..	..	..
J. C. Hutton Pty., Ltd., Roma st., Brisbane	Hutton's Special Fertiliser	..	5·0	3·5	..	11·0	..	..	..	70	22	8
Ditto	Hutton's Special Complete Fertiliser	..	4·5	3·2	..	9·8	..	5·0	..	70	22	8
Webster and Co., Ltd., Mary st., Brisbane	"Crown Brand" Special Complete No. 1	4·0	..	13·5	..	..	..	7·0	..	..	..	..
Ditto	"Crown" Mixture No. 2	2·0	2·0	..	..	15·75	..	7·0	..	75	25	..
Ditto	"Crown" Mixture No. 3	3·25	2·0	..	..	16·0	..	3·5	..	75	25	..
Ditto	"Crown" Mixture No. 4	2·75	2·25	..	..	18·0	..	..	..	75	25	..

SYNTHETIC FERTILISERS.

Registered by the Undermentioned as Producers within the Meaning of the Regulations.	Name of Fertiliser	Producers' Guarantee.	
			Per cent.
Abel Lemon and Co., Pty., Ltd., Market st., Brisbane	Diammonphos (Floraphos)	Nitrogen Phosphoric Acid, Water Soluble	20·0 52·0
Ditto	Floranid	Nitrogen as Urea	46·0
Ditto	Nitrophoska	Nitrogen Phosphoric Acid Potash	16·5 16·5 21·5

Brisbane, 31st March, 1930.

CLIMATOLOGICAL TABLE—MARCH, 1930.

SUPPLIED BY THE COMMONWEALTH OF AUSTRALIA METEOROLOGICAL BUREAU, BRISBANE.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·90	86	76	89	20	72	7,8	1,129	13
Herberton	..	78	62	84	23	52	7	377	10
Rockhampton	30·01	86	68	90	17	65	5	102	10
Brisbane	30·09	81	65	87	19	60	26	285	20
Darling Downs.									
Dalby	30·07	83	59	90	8	54	3,26,27, 30,31	262	5
Stanthorpe	..	76	55	84	8	46	26	230	10
Toowoomba	..	75	58	83	17,18	52	5,22	168	12
Mid-interior.									
Georgetown	29·89	91	66	96	17	59	7,23,24	23	2
Longreach	29·96	94	67	100	7	61	20,22	57	2
Mitchell	30·04	87	62	95	7,10	51	24	99	5
Western.									
Burketown	29·89	90	72	96	17,18,24	65	23,24	431	4
Boulia	29·92	97	69	104	10	61	27	30	1
Thargomindah	29·99	92	68	101	9	61	25	..	..

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING MARCH 1930 AND 1929, FOR COMPARISON

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.	No. of Years' Records.	Mar., 1930.	Mar., 1929.
North Coast.	In.		In.	In.
Atherton	8·93	29	3·10	8·87
Cairns	18·20	48	14·22	29·66
Cardwell	16·17	58	7·64	25·84
Cooktown	15·32	54	11·42	10·39
Herberton	8·14	43	3·77	10·45
Ingham	15·63	38	18·51	26·25
Innisfail	26·38	49	38·03	26·46
Mossman	17·58	17	14·91	19·93
Townsville	7·56	59	1·02	9·91
Central Coast.				
Ayr	6·90	43	0·66	16·66
Bowen	5·85	59	0·64	7·41
Charters Towers ..	3·92	48	2·51	7·61
Mackay	12·40	59	4·54	11·74
Proserpine	12·65	27	7·01	15·19
St. Lawrence.. ..	5·53	59	0·51	1·98
South Coast.				
Biggenden	3·94	31	5·49	2·02
Bundaberg	5·26	47	1·77	2·49
Brisbane	5·71	79	2·85	6·59
Caboolture	7·69	43	4·30	8·53
Childers	4·67	35	1·12	3·02
Crohamhurst ..	11.41	37	7·25	7·36
Esk	4·97	43	2·87	9·53
Gayndah	3·11	59	0·77	1·06
Gympie	6·29	60	3·06	4·18
Kilkivan	3·94	51	1·99	1·22
Maryborough ..	6·09	58	3·05	2·50
South Coast—continued:	In.		In.	In.
Nambour	9·37	34	7·72	7·57
Nanango	3·50	48	1·42	2·84
Rockhampton ..	4·67	43	1·02	3·67
Woodford	8·07	43	4·00	7·72
Darling Downs.				
Dalby	2·76	60	2·62	4·10
Emu Vale	2·51	34	1·49	4·12
Jimbour	2·62	42	3·18	3·05
Miles	2·73	45	1·60	4·23
Stanthorpe	2·70	57	2·30	3·82
Toowoomba ..	3·85	58	1·68	5·65
Warwick	2·58	65	1·25	4·34
Maranoa.				
Roma	2·66	56	0·25	2·57
State Farms, &c.				
Bungeworgorai ..	1·63	16	0·22	2·23
Gatton College ..	3·25	31	3·56	4·15
Gindie	2·64	31	3·18	2·42
Hermitage	2·28	24	..	4·14
Kairi	8·40	16	2·24	7·88
Mackay Sugar Experiment Station ..	11·51	33	4·39	12·17
Warren	2·68	15	..	3·03

GEORGE G. BOND, Divisional Meteorologist

Answers to Correspondents.

BOTANY.

The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—

Dawson Valley Plants Identified.

D.H. (Theodore, Dawson Valley).—Your specimens are:—

1. *Panicum globoideum,* Shot Grass, a grass much relished by stock, highly nutritious and one of the best pasture grasses we have. It is well worth propagating on your property.
2. *Aristida* sp., the Three-pronged Spear Grass. The Aristidas or Spear Grasses are only useful as fodders in their very young stages, soon coming into seed and proving unpalatable to stock. Their value as forage is very little.
3. The specimen imperfect, but seems to be *Bryonia laciniosa,* the native Bryony, a poison vine. See pamphlet for further particulars.
4. *Vitis opaca,* a small native grape; not poisonous.
5. *Solanum* sp., a species of Potato Bush. These plants are very common in the average mixed native pasture in Western Queensland, and the green berries of most sorts possess solanine—a poisonous alkaloid—but apparently trouble from them is not very common.
6. *Malvastrum spicatum,* a common weed of the mallow family, of which I have not heard a common name.
7. *Sida corrugata.* The same remarks as apply to No. 6.
8. A plant of the *Chenopodiaceae,* or Salt Bush family; a bigger specimen is required for identification. Plants of this family are not generally regarded as poisonous, and most are recognised as useful fodders.

Regarding your query about *Agave,* these plants are not known to be poisonous.

Your letter is being referred back to the Chief Inspector of Stock, Major A. R. Cory, M.R.C.V.S., for further report.

A Native Dodder.

W. (Winton)—

Your specimen proved to be *Cuscuta australis,* a native dodder. The dodders are parasitic plants which soon leave the ground and become wholely parasitic on other plants. One of them is a very bad weed in Queensland and New South Wales on lucerne. The one you send is a native species and is most abundant on the coast. We have had very few specimens from inland parts, but this season, in addition to your specimen, we have received material from Saltern and Longreach, so evidently it is fairly common. It has the power of becoming a bad weed as it attacks cultivated plants as well as native herbage and weeds, though it is most frequently found on the latter. It is not known to be poisonous in any way, though if stock eat it in quantity it might cause mechanical injury by its stringy nature, but on this point we are doubtful.

Panicum palmifolium. Subterranean Clover. Molasses Grass.

J.T. (Yeppoon)—

Your grass specimen is *Panicum palmifolium,* a native of Tropical Asia, cultivated fairly extensively in most warm countries as an ornamental garden species. We do not know that it has any particular value as a fodder, but if you wish to try it out the plant is easily propagated by root division.

The Department does not stock seed of Subterranean Clover, but seed is obtainable through the ordinary commercial channels. We rather doubt, however, if you will have success with this species as far north as Yeppoon and think the best species would be the ordinary White Dutch Clover.

We do not know anybody stocking seed of Molasses Grass, but if you write to Mr. N. A. R. Pollock, Northern Instructor in Agriculture, Townsville, he might be able to put you on to a supply. The grass is grown to a limited extent in northern New South Wales, and if you wrote to Mr. J. N. Whittet, Agrostologist, Department of Agriculture, Sydney, New South Wales, he might be able to give you some information.

Pig Weed.

H.B.R. (Torrens Creek)—

Your specimen is a species of Pig Weed, *Portulacca filifolia.* It is not known to be poisonous, but the Pig Weeds, like many other succulent plants, if eaten in quantity by hungry stock are apt to bloat them severely; death, especially in the cases of travelling stock, sometimes occurring. They are not known, however, to possess any actual poisonous principle, and in fact are generally regarded as useful forage.

Rag Weed.

A.W.F. (West Burleigh)—

Your specimens represent *Ambrosia maritima,* the common Rag Weed, a native of the Mediterranean region naturalised here and there in Australia. We have had it from the neighbourhood of Burleigh and Currumbin as far back as 1915, but it does not seem to become abundant and has spread to no other locality so far as we know. It has, however, a possibility of becoming a bad weed, and on this account should be destroyed.

Panicum adspersum.

INQUIRER (Hughenden)—

The grass is *Panicum adspersum,* a native species of Panic Grass. Like other rather succulent broad-leaved members of the genus Panicum, it is a good fodder and should make excellent hay. The grass was very interesting to us as it was the first specimen we had received from Queensland, though it has been recorded for Central Australia and Northern Territory.

Datura ferox.

R.A.T. (Atherton, N.Q.)—

The specimen is *Datura ferox,* a species of Stramonium or Thorn Apple, naturalised in Queensland for some years past. The only previous locality we had for it, however, was the western Darling Downs, and this apparently is the first time the plant has made its appearance in North Queensland. Like all other members of the genus it is poisonous, and hence should be destroyed as far as possible from paddocks where it makes its appearance.

PEDIGREED STOCK—IMPORTATIONS FROM BRITAIN.

The scheme to encourage the importation of pedigree livestock from the United Kingdom into Australia by an arrangement with the shipping companies to carry the animals freight free, which has been under discussion for some years past, has been finalised, and will remain in operation till 30th September, 1931.

It is applicable only to pedigree breeding cattle, sheep, and swine produced in the British Isles, and purchased by the applicant in and imported from the United Kingdom to Australia. The main points in the scheme are: (1) that the cost of purchase must be borne by the applicant, (2) the shipping companies (with one exception) have agreed to carry the stock freight free, and (3) all other approved incidental expenses (insurance excepted) connected with the transport of the stock from the port of export in the United Kingdom to the port of import in Australia will be shared equally by the applicant, the Commonwealth and State Governments (equally), and the Empire Marketing Board.

The scheme will only apply to animals for which a certificate of full registration by a recognised stud society is furnished, together with the vendor's certificate of breeding and production record (if any), and also a certificate that the animals conform to the registered society's standard in respect of type and soundness.

Applicants must not dispose of any of the stock within a period of two years without the permission of the Minister for Agriculture, and must, at their own expense, keep every animal insured in the joint name of the applicant and the Minister. They must also make the necessary arrangements for shipment and transport, and pay the whole of the expenses, claiming on the Department of Agriculture in their State for reimbursement of the amount due by the Commonwealth and State Governments and the Empire Marketing Board.

General Notes.

Honey Board Election.

The annual election of four members for the Honey Board resulted as follows:—

Robert Victor Woodrow (Woodford)	224 votes.
Henry Edgar Fagg (South Killarney)	218 "
Owen Norman Tanner (Samford)	186 "
John Schutt (Holstein Park, Perthton)	183 "
John Duncan Colin Campbell (Hillview, Beaudesert)	64 "
Alexander Roy Brown (Park Ridge)	56 "
Augustus Frederick Spry (Clayfield)	50 "
Charles William Edwards (Greenbank, Kingston)	43 "

All growers owning not less than five hives of bees in movable frames and market the honey and beeswax therefrom were eligible to vote, and three of the present members (Messrs. Woodrow, Fagg, and Schutt) were re-elected. Mr. Pickering did not seek re-election, and his place will be taken by Mr. O. N. Tanner.

Messrs. R. V. Woodrow (Woodford), H. E. Fagg (South Killarney), O. N. Tanner (Samford), J. Schutt (Holstein Park, Perthton), have been appointed members of the Honey Board as from the 16th April, 1930, to 15th April, 1931.

Staff Changes and Appointments.

Mr. C. D. Hogan has been further seconded for duty as Senior Clerk (Accounts), Agricultural Bank, Brisbane, for three months as from 12th March, 1930.

Mr. P. D. Edwards has been appointed Government Representative on the Bulloo Dingo Board.

Mr. A. K. Williams has been appointed a Ranger under the Animals and Birds Acts, at Rockhampton, and Mr. J. E. Jones has been appointed a Temporary Ranger under the abovementioned Acts, with headquarters at Dalby.

The appointments of Messrs. E. R. Boyd and S. E. Pegg as Inspectors under the Dairy Produce Act have been confirmed as from 2nd September and 16th September, 1929, respectively.

Mr. J. C. Sabine, of Stanthorpe Border Gate, has been appointed an Inspector of Stock; Mr. H. B. Ford has been appointed an Inspector of Stock on probation. Mr. P. J. Short has been appointed a Temporary Inspector of Slaughterhouses, at Warwick.

The appointment of Mr. L. R. Macgregor as a Member of the Committee of Direction of Fruit Marketing until the 31st December, 1930, has been cancelled, and in his place Mr. E. Graham, Director of Marketing, or, in his absence, a Deputy to be appointed by the Minister, has been appointed a Member of the Committee of Direction until the 31st December, 1930.

Mr. J. L. F. Foran, Chemist, Stock Experiment Station, Townsville, has been appointed Analyst, Agricultural Chemical Laboratory, Brisbane, as from 1st March, 1930.

Mr. J. C. Pryde has been appointed a Temporary Inspector of Stock at Maryborough for the period from 22nd April, 1930, to 19th May, 1930, in order to relieve Mr. J. Taylor, District Inspector of Stock at Maryborough, who will be on leave for that period.

Acting Sergeant E. M. James, Officer in Charge of Police, South Johnstone, has been appointed an Inspector of Slaughter-houses; the services of Mr. P. J. Short, Temporary Inspector of Slaughter-houses at Warwick, have been continued for the period from 1st April to 30th April, 1930.

Approval has been given to the Queensland Cane Growers' Council to appoint Mr. William McRobbie, of Silkwood, South Johnstone, to be a Member to complete the representation of the South Johnstone Mill Suppliers' Committee.

The appointment of Mr. G. A. Cameron, Police Magistrate, Townsville, as Chairman of the Inkerman, Invicta, Kalamia, and Pioneer Local Sugar Cane Prices Boards has been cancelled, and, in lieu thereof, Mr. T. R. Kennedy, Police Magistrate, Bowen, has been appointed Chairman of those Local Boards.

Mr. J. W. Weir has been appointed a Temporary Ranger under the Animals and Birds Acts at Goondiwindi; and the headquarters of Mr. J. H. Jones, Temporary Ranger at Dalby, have been changed for the present to Mungindi.

Close Season for Ducks.

The present close season for ducks, which commenced on 1st October, 1929, was due to end on the 30th April, 1930. Owing to the proximity of the Easter holidays to this date, is was desired to give sportsmen the opportunity of shooting ducks during these holidays, and consequently an Order in Council has been passed ending the close season for ducks at midnight on the 17th April instead of on the 30th April, 1930. This applies only to No. 1 District for the purposes of the Animals and Birds Acts, as described in an Order in Council of the 27th March, 1930, comprising the southern part of Queensland.

Smuts of Barley—Seed Treatment.

Seed treatment with copper carbonate is not completely effective in the control of smut in oats, apparently because some of the spores are protected by the enclosing husks of the oat grain. Nor, except in the case of Skinless, is the copper carbonate treatment effective in the control of covered smut of barley. Varieties other than that mentioned should be treated by thoroughly sprinkling a heap of the seed with formalin solution (1 pint to 40 gallons water) and covering the wet heap with a bag for four to six hours to allow the vapour of the formalin to penetrate the mass. Sowing should then be carried out soon after treatment in a moist, well-prepared seed-bed.

Where formalin is used, seed should be obtained from clean crops where practicable and sowing should not be made in land infected by the smut.

Fungicide treatments of barley seed infected with loose or flying smut are unsatisfactory. The most practicable method of avoiding this disease is to select seed from crops that are free, which can be most effectively accomplished by growing a seed plot for the production of smut-free seed for the main crop. If seed treatment is to be used the hot-water method is best. The temperature used should be 52 deg. Cent. (126.6 deg. Fah.) and the time of immersion fifteen minutes.—"A. and P. Notes, New South Wales Department of Agriculture."

Government Representation.

The Minister for Agriculture and Stock, the Hon. Harry F. Walker, has announced that, in pursuance of "*The Primary Producers' Organisation and Marketing Acts*, 1926 *to* 1928," he had appointed Mr. E. Graham, Under Secretary, Department of Agriculture and Stock, and Director of Marketing, to be a Member of the following Boards for the periods set out hereunder:—

Board.	Term of Office. From.	To.
Arrowroot	1st April, 1930	14th April, 1931.
Atherton Maize	1st April, 1930	31st March, 1931.
Atherton Pig	1st April, 1930	31st December, 1930.
Butter	1st April, 1930	30th June, 1931.
Broom Millet	1st April, 1930	10th March, 1931.
Canary Seed	1st April, 1930	28th February, 1931.
Cheese	1st April, 1930	31st July, 1930.
Cotton	1st April, 1930	31st December, 1931.
Egg	1st April, 1930	30th April, 1931.
Honey	1st April, 1930	15th April, 1931.
Peanut	1st April, 1930	31st August, 1930.

Mr. Graham has also been appointed a Member of the Queensland Wheat Board until the 31st August next.

As it will be impracticable for Mr. Graham to attend all meetings of the Commodity Boards at the present time, Deputies have been appointed to represent him on those Boards. Mr. H. C. Quodling, Director of Agriculture, will attend meetings of the Wheat Board and the Canary Seed Board; Mr. A. E. Gibson, Senior Instructor in Agriculture, will attend meetings of the Arrowroot, Broom Millet, Honey, and Peanut Boards; Mr. C. McGrath, Supervisor of Dairying, has been chosen as Government Representative on the Butter and Cheese Boards; Mr. C. L. Hassell, Instructor in Agriculture, Atherton, on the Atherton Maize and Atherton Pig Boards; Mr. W. G. Wells, Cotton Specialist, on the Cotton Board; while Mr. P. Rumball, the Poultry Expert, will be the representative on the Egg Board. Although Mr. Graham has had Deputies appointed to attend meetings in his stead, this will not preclude him from giving any assistance that he may render at any time to any of the Commodity Boards that have been constituted in Queensland.

Colour Standards for Tomatoes.

A Regulation providing for colour standards for Tomatoes as "Ripe," "Coloured," or "Green," was passed on the 7th November, 1929. However, since then it has been found impracticable for tomato growers and packers to conform to these standards, and, as a result, a further Regulation has now been passed, rescinding the previous Regulation of the 7th November, 1929, which set up the abovementioned standards.

Pig Levy Regulations.

Additional Regulations have been made under "*The Fruit Marketing Organisation Acts*, 1923 *to* 1928," relating to a levy on figs. The Regulations are numbered from 179 to 186, and empower the Committee of Direction of Fruit Marketing to make a levy on all figs delivered to canners.

As the present crop of figs was estimated to be much in excess of the quantity that the canners offered to take, a meeting of fig growers decided to institute a levy on themselves that, in consideration of the canners taking an extra 20 tons, they might advertise to help clear this extra quantity. A ballot of fig growers being taken resulted in a majority in favour of the levy, and accordingly the new Regulations have been passed.

The Regulations provide that—

The Committee of Direction is empowered to make a levy on the growers of all figs delivered to canners from 1st January to 30th April, 1930, both inclusive.

The levy shall be on the basis of the net weight of figs delivered by them, and shall be at the rate of £2 per ton, and/or a proportionate part of £2 for each portion of a ton.

The amount of such levy shall be deducted by the Committee of Direction from amounts payable to growers on figs delivered to canners, and levy payable by any growers on figs for which they have already received payment shall be deducted from amounts later payable to such growers. All sums raised by the said levy shall be expended upon advertising in the interests of the fig growers concerned. Any fruitgrower who shall fail to pay the levy shall be guilty of an offence, and be liable to a penalty not exceeding £20, without prejudice to his liability to pay the amount of the levy. The levy shall be deemed to have been made upon the advertisement in at least one paper circulating throughout that part of the State concerned, of a resolution passed by the Committee of Direction of Fruit Marketing.

Profitable Pigs—Can any Other Reader Beat This?

Messrs. Baker Bros., of West Haldon, Greenmount, write:—

In your March issue of the Journal you ask can anyone beat Mr. Nugent's net profit of £5 from pigs for every dairy cow kept. I submit here our net profits from pigs for the last four years.

	£	*s.*	*d.*
1926.—Total milch cows kept on farm, 25.			
Net profit from pigs	229	12	9
1927.—Same number of cows.			
Net profit from pigs	153	15	10
1928.—Same number of cows.			
Net profit from pigs	148	16	5
1929.—Total milch cows kept this year, 27.			
Net profit from pigs	256	3	4

This works out at average for the four years mentioned of £7 14s. 6d. net profit from pigs for every dairy cow kept on our farm or owned by us. We did not purchase any feed for pigs over this period, other than lime and salt, the cost of which was under £2 in all. Pig feed has been grown on the farm.

I do not desire to say anything of our system of feeding more than that it is as near as we can practically follow what Professor Murray, of Queensland Agricultural High School and College, has been teaching for years, and I merely mention this to demonstrate the soundness of Professor Murray's teaching.

If these figures seem doubtful, we invite you or any of your fellow officers to inspect our books. We purchased pigs over the fours years mentioned, and all pigs were sold to Darling Downs Bacon Co.

We enclose herewith sum of 3s. as subscription (renewal) to the Agricultural Journal for the next three years.

Canary Seed Board.

The term of office of the Canary Seed Board constituted in December, 1927, expired on 28th February, 1930. On the 16th January, 1930, notice was given of the intention of the Governor in Council to extend the operation of the Canary Seed Board for a further three years. Opportunity was given to growers to petition against the issuing of an Order in Council extending the operations of the Board, but no petition was received. Consequently, an Order in Council has now been passed extending the operations of the Canary Seed Board for a further period from the 1st March, 1930, to the 28th February, 1933.

Hand Boring Outfit.

A hand-boring plant, useful for locating water has been used with good results at Cowra Experiment Farm, New South Wales. It consists of an ordinary 2-inch wood-boring auger, preferably with a screw point cut-off, and rods of ½-inch or ⅝-inch iron of sufficient length for the required depth. The iron rods comprise one short rod of about 3 ft. 6 in. in length and the remainder about 6 ft. 6 in. or 7 ft. long, each with a close hook at one end and an eye at the other end. Both the hooks and eyes require to be made small enough to pass easily down the 2-inch bore. Any blacksmith can make the rods.

A bar of ⅝-inch iron about 1 ft. 8 in. long is necessary to pass through the eye of the uppermost rod to turn the auger. An eye is also necessary on the auger, so that the rods can be hooked into it.

A commencement is made by boring the auger into the ground, withdrawing it, of course, to raise the earth to the surface, until the eye gets near the ground. The short rod is then attached and boring continued until the eye of it reaches almost to the ground surface. The auger is then withdrawn and one of the long rods attached to it, and boring continued until the eye of the long rod reaches almost to the ground, when the short rod is attached to it and boring continued until another long rod becomes necessary.

Barley Board.

On 23rd January, 1930, the Governor in Council gave notice of intention to make an Order in Council creating a Barley Board for seven years, and called for a petition for a poll to decide whether the Order should be made. A petition was handed in, and accordingly a poll was held on the 17th April, 1930, the result being 117 votes in favour of the setting up of a Barley Board, and 27 against. As the required 60 per cent. majority was procured, an Order in Council has now been made, setting up a Barley Board for a period of seven years. The Order in Council provides:—

1. All barley produced in Queensland for seven years from the date of this Order shall be a commodity under and for the purposes of the Primary Producers' Organisation and Marketing Acts.

2. There is constituted a Board in relation to barley, consisting of two elected representatives of growers and the Director of Marketing; the growers' representatives to be elected annually.

3. The Board shall be a Marketing Board.

4. All persons who, during the twelve months preceding any poll or election held in connection with the said commodity, harvested for sale barley in any part of Queensland, shall be eligible to vote.

5. The whole of the said commodity shall, upon the making of this Order, be divested from the growers thereof and become vested in and become the property of the Board as the owners thereof.

6. The provisions of the Acts are hereby extended to the said commodity and the said Board and all persons, things, and matters concerned.

The question of the constitution of a Barley Board for a period of seven years was submitted to barley growers, and the voting was as follows:—

For	117 votes.
Against	27 ,,

A ballot for the election of two members on this Board was also taken with this result:—

George Burton (Cambooya)	124 votes.
Michael Coleman (Nobby)	115 ,,
Harry Obst (Shepperd)	47 ,,

Are We Practical?

"I came once more on the real Goethe when it struck me in connection with his activities that he could not think of any intellectual employment without practical work side by side with it."—Dr. ALBERT SCHWEITZER.

Young Farmers and the Scrub Bull.

A notable endeavour is being made by an English young farmers' club in the direction of livestock improvement. A "Young Bull Society" has been formed under the auspices of the club, and members are purchasing pedigree bull calves, which are to be brought along for twelve months or so and then shown in competition and offered for sale. It is believed that the scheme will aid largely in the elimination of the "scrub" bull, and will raise the standard of live stock along the countryside.

TO WHEATGROWERS.

The demand for Departmental Wheats for this season's sowing has been so heavy that practically the only seed now available for distribution at the Roma State Farm is of the "Watchman" variety.

"Duke of York" seed is still available at the Chief Office of the Department, William street, Brisbane.

Atherton Maize Board.

The successful candidates in the recent Atherton Tableland Maize Board election were:—

Harold Henry Collins, Atherton;
Lyall Reginald Crouch, Atherton;
John Gargan, Atherton;
William Bailey, Atherton;
Richard Ernest Moss, Tolga.

Messrs. Collins, Crouch, and Bailey were members of the old Board.

There were twelve candidates. The new Board will hold office for a term of one year as from the 1st April, 1930.

The Royal Society of Queensland.

The Annual Meeting of the Society was held in the Geology Lecture Theatre of the University at 8 p.m. on Monday, 31st March, 1930. The President, Professor J. P. Lowson, occupied the chair, and about sixty members and visitors were present. The Annual Report and Balance-sheet were adopted.

The following officers were elected for 1930:—President, Mr. J. B. Henderson, F.I.C.; Vice-Presidents, Prof. J. P. Lowson, M.A., M.D. (*ex officio*) and Dr. D. A. Herbert; Hon. Secretary, Mr. F. A. Perkins, B.Sc. Agr.; Hon. Librarian, Mr. W. D. Francis; Hon. Treasurer, Mr. E. W. Bick; Hon. Editors, Mr. H. A. Longman, F.L.S., C.M.Z.S., and Dr. W. H. Bryan, M.C.; Hon. Auditor, Prof. H. J. Priestley, M.A.; Members of Council, Dr. R. W. Cilento, Dr. T. G. H. Jones, Mr. J. A. Just, M.I.M.E., Prof. H. C. Richards, D.Sc., and Mr. C. T. White.

The following were proposed for ordinary membership:—Mr. A. J. Stoney, B.E.E., proposed by Dr. Herbert and Mr. Perkins; Dr. J. M. Roe, proposed by Mr. Buhot and Mr. Perkins; Mr. E. M. Shepherd, B.E., proposed by Mr. E. J. Wood and Mr. Perkins. Messrs. D. O. Atherton and H. K. Lewcock, M.Sc., were unanimously elected ordinary members of the Society.

The President moved and Prof. Richards seconded the following motion, which was carried unanimously:—"That a message be sent to Sir Douglas Mawson, Capt. Davis, Prof. Harvey Johnston, and the rest of their party congratulating them on their safe return and the wonderful work achieved."

Prof. J. P. Lowson delivered his Presidential Address, entitled "Recent Psychology." On the motion of Prof. Goddard, seconded by Prof. Scott Fletcher, a vote of thanks was accorded the retiring President for his address. Prof. H. C. Richards and Mr. H. Longman expressed the Society's appreciation of the presence of His Excellency the Governor.

The Minister for Agriculture.

Thus the "Queensland Producer" of 2nd April:—

"This journal has at various times in the past, particularly when Mr. Walker was in opposition, deemed it desirable to call in question certain actions of Mr. Walker. We reserve to ourselves the right to express opinions with respect to the attitude of any public man in relation to agricultural organisation. We feel bound to say, however, that since Mr. Walker became Minister for Agriculture he has certainly made good. He has gone out of his way to get down to bedrock as to what the producers' problems really are. He has made himself most approachable and has been prepared to listen to suggestions and also to statements by producers' representatives of their difficulties, and he has done so with the utmost patience and consideration. Mr. Walker has been working very long hours and has certainly devoted himself to the cause of the farmers of Queensland.

"He has also taken a very big view of the possibilities of the development of Queensland agriculture, and his Wheat Agreement Scheme, designed to bring about increased production of wheat, was a masterpiece, and brought about harmony between the Wheat Board and the millers where formerly there was discontent and continual strife. His attitude in establishing the Banana Industry Protection Board was a big move. His broadminded action in collaborating with the Hon. F. M. Forde in a big forward step to develop the cotton industry is typical of the way in which Mr. Walker sheds the political aspects for wider national point of view."

Native Birds—Variation of Open Season.

Orders in Council have been issued under "*The Animals and Birds Acts*, 1921 *to* 1924," providing for a variation of the open season for certain native birds in Queensland. For this purpose the State has been divided into three districts, instead of two as hitherto. The Southern District (No. 1) comprises the pastoral districts of Moreton, Darling Downs, Wide Bay, Burnett, Maranoa, Warrego, Gregory South, and that portion of Leichhardt south of the 25th parallel of south latitude. The Central District (No. 2) consists of the pastoral districts of Port Curtis, South Kennedy, and Gregory North, that portion of Leichhardt north of the 25th parallel of south latitude, and that portion of Mitchell south of the 22nd parallel of south latitude. The Northern District (No. 3) comprises the pastoral districts of Cook, Burke, and North Kennedy, and that portion of Mitchell north of the 22nd parallel of south latitude.

In pursuance of an Order in Council issued on 27th March, the open season will extend from the 1st May to the 30th September in the Southern District, from the 1st July to the 30th November in the Central District, and from the 1st June to the 31st October in the Northern District, in respect of the following birds:—

Brush or Scrub Turkey;
Budgerigah or Shell Parrot;
Bustard or Plain Turkey;
Bald Coot, Swamp-hen, or Redbill;
Black Moor-hen or Water-hen;
Cockatoo Parrot or Quarrion;
Dotterel, all species excepting Sand Dotterels;
Emu;
Goose and Duck, all species excluding Black Swan;
King Parrot;
Long-billed Cockatoo or Corella;
Lorikeets or Honey Parrots;
Native Hen;
Pigeon and Dove, all wild species except "Squatter," "Whampoo," and "Nutmeg";
Plover, all species excepting Golden Plover;
Quail, all species;
Redwing Parrot;
Ring-neck Parrot;
True Coot.

Sportsmen in Southern Queensland are specially requested to note that the variation involves the postponement of the opening of the season for the birds mentioned, until the 1st May next.

No variation has been made in respect of those native birds or animals which are totally protected throughout the State.

The Master Stockman.

With glad acclaim and bearing garlands bright and wreaths of bay
We sing the glories of the fecund fields where herdsmen-shepherds hold their gentle sway!
In pastures green, by running brooks; in bosky dells, in grassy nooks,
The distant mellow jangling of sweet bells proclaims the peaceful paths
Of lowing herds and fleecy flocks, the gifts supreme of husbandry.

Blessed be the land on which they graze! And blessed those who guide them on their ways!
Wielders of power that verges on the infinite itself!
Dreamers of dreams who live to see their dreams come true!
Workers of miracles in a world that's all their own!
Keepers of keys to life's most hidden mysteries!
Let kings and lords of lesser human realms make way!
While all the nations from the depths of grateful hearts
Unite to crown the master stockman master of the art of arts!

—A.H.S., in "The New Breeder's Gazette," Chicago.

Chinchilla Rabbit Skin Values.

An extract from Bulletin No. 5, Department of Industries and Commerce, New Zealand, containing a summary of the finance, trade, and industries of the Dominion for the quarter and year ended 31st December last, has been brought under the notice of the Minister for Agriculture and Stock (Mr. H. F. Walker).

In this summary it is noted that the prices of Chinchilla rabbit skins have fallen to a considerable extent, together with the prices of other furs. At a sale in London during the period under review, when only 18,000 skins were sold out of 40,000 offered by the Hudson's Bay Company, prices realised for the quantity sold were as follows:—

Firsts	1s. 5d. to 3s. each.
Seconds	6d. to 1s. 6d. each.
Thirds	6d. to 9d. each.

The Mininster drew attention to the fact that this confirmed information recently supplied to him by the Agent-General in London, and which has already appeared in the Press.

Larry.

(To the late Larry Doyle, Stock Inspector, a man among men.)

The outback tracks where the mobs go through,
Where spinifex wither and spoil;
The dusty plains where gidyeas grew,
Were friends of Larry Doyle,
Where a man's size job is done each day,
And the law of the plain is old;
Not every man, as Doyle, could say,
"Honour was dearer than gold."

Though death came quick in his splendid year,
And we are poor with his loss;
Many a man will stay a tear,
Where a mother bears her cross.
"They oft die young, the Gods must take,"
E'er life has fashioned her coil,
But Oh, we are proud for the outback's sake,
There are men, "Real men like Doyle."

—James M Matheson, Mount Isa, in the "Cloncurry News."

The late Mr. Lawrence P. Doyle, Inspector of Stock at Mount Isa, in the far nor'-west of the State, was accidentally drowned in flood waters while attempting to cross Lagoon Creek, near Mount Isa, on 4th February last. He was a promising and valued officer of this Department. —Ed.

The Farmer's Intelligence.

Although the world's oldest industry, the cultivation of the land is even now treated with indifference by a section of the public, which—forgetful of the fact that without the farmer it could not exist—regards the tiller of the soil as an inferior being, deficient in all those qualities of business, thrift, and application of which it believes itself to be the sole possessor. That this was not always the case is clear from the works of some of the greatest writers of ancient times, all of whom gave to agriculture the first place among the professions of man.

Virgil, one of the greatest poets of all time, regarded the art of husbandry as of so much importance as to devote the best of all his wonderful poems to the description of its various branches; Ovid extolled the joys of country life, and the Greek historian Herodotus has left records that tell the methods employed by the ancient Egyptians in rendering their country the granary of the world.

These writers gave to the farmer the credit of being the possessor of more than average intelligence and skill, qualities without which the modern agriculturist would long ago have failed to hold his own in the markets of the world.—"Live Stock Journal" (England).

Czech Women and Farming.

"Back to the land" has been a slogan in various countries for many years, but nowhere has this cry been heard with such enthusiasm that it has become a national creed as in the prosperous Bohemian Republic of Czechoslovakia, which came into existence after the World War, when the Austrian Empire was split up into small independent States. Men and women, young and old, are trained to take its cultivation seriously. In towns and countryside schools have opened where women as well as men may acquire practical knowledge in everything which pertains to farming. No woman shirks this training, whether she is the daughter of a farmer or a millionaire. All workers on the land are encouraged to spend their spare time in making not only beautiful embroideries, but glass objects, furniture, kitchen utensils, and pottery. Ten thousand crowns are given away every year in prizes. The rural population in Czechoslovakia has preserved the artistic traditions of their forefathers, and peasants, especially of old Bohemia, have preserved and developed the art which made them famous in the past.

Scientific Literature—A Commonwealth Catalogue.

Workers in all branches of science, in agriculture, in medicine, in the technical and other fields are always handicapped by the difficulties of obtaining the literature necessary for their work. It is manifestly impossible for the private worker to accumulate for himself a library adequate to his needs. The worker in departments or institutions, although in a better position, has constant need to refer to libraries other than his own in order to be able to keep abreast with the literature in his subject.

In Australia, investigators are particularly handicapped by difficulties inevitable in a country where technical libraries are relatively few and distances between them often very great. While these disabilities cannot be completely remedied, they can be considerably reduced by making readily available a catalogue of the contents of these libraries. A publication of this description enables the worker to locate without waste of time the literature that he requires.

Insofar as periodicals are concerned, and it is periodicals that are of paramount importance to the average worker, a catalogue designed to serve this purpose has now been published by the Commonwealth Council for Scientific and Industrial Research. This catalogue, which has been prepared under the editorship of Mr. E. R. Pitt of the Melbourne Public Library, includes periodicals (in all languages) of a scientific and technical nature and also the publications issued serially by Government departments, institutions, and societies in all countries. In all, 132 Australian libraries have been catalogued. Included in these are the public libraries, the parliamentary libraries, and the libraries of Government departments, of the universities, the scientific societies, and institutions in each State.

A copy of this catalogue will be found invaluable not only on the shelves of all libraries but also to medical men, technical chemists, engineers, architects, veterinarians, and those engaged in agricultural research, in public health and sanitation matters, and to all classes of builders and manufacturers. Throughout the preparation of the catalogue special attention has been paid to Australian publications, and it will therefore serve as a record of all periodicals of a scientific and technical nature that have been published in Australia.

Neglect of Farm Implements.

The formation of a society for the prevention of neglect of farm implements was suggested by Mr. Hugh B. McFadzean, in the course of an address which he gave to the members of the Glasgow and West of Scotland Agricultural Discussion Society on the subject of "The Care of Farm Implements." Mr. McFadzean advocated "houses for implements," so as to prevent weather decay when the implements were not in use. Another essential was the periodical application of good quality paint, which alone could combat the destructive power of corrosion, especially of steel work. In conclusion, he said that the farmer in these days required to use modern machinery, and to keep it in first-class condition. All implements should be carefully overhauled, cleaned, and oiled before being brought into use.

On Buying a Herd.

It is of great importance that every animal destined to be kept in the herd for breeding purposes should have passed the tuberculin test, and whilst it sometimes has happened that an animal has passed the test on one occasion and reacted on another, an owner should, so far as possible, endeavour to make sure on the point ere using such animal, be it male or female, for breeding purposes.

Every breed of cattle possesses its own distinctive features, and although such may be more or less subdivided, there nevertheless is, broadly speaking, a distinctiveness in type in every breed which is as near the ideal as has yet been reached, and at which every breeder should at least aim as his objective.

Whilst in some ways it is an advantage to commence with a young bull and some heifers, there is, on the other hand, a good deal to be said in favour of trying to get hold of a bull which has already done good work in a herd, and also of some cows which likewise have proved their worth as breeders. Having acquired the nucleus of a herd, it is up to the owner to keep in mind the particular type of animal he favours, and to endeavour, so far as possible, not only to stick to such type, but to try and improve on it.—WINDYCUSS, in the "Live Stock Journal" (England).

Decrease in Swine Fever (also called Hog Cholera) in the United States of America.

Hog cholera is less prevalent and has resulted in fewer losses during 1929 than ever before in the history of records by the United States Department of Agriculture, according to Dr. U. G. Houck, associate chief of the Bureau of Animal Husbandry, who has just released a summary of information assembled from thirty-one States.

In only four States—Indiana, Michigan, Nebraska, and Ohio—is hog cholera more prevalent than last year, the lowest loss period up to the current year, Dr. Houck's report shows. Little change in the situation this year is announced for Colorado, Kentucky, North Carolina, Texas, Illinois, Tenessee, Mississippi, and Wisconsin. Less cholera prevails in Alabama, California, Georgia, Kansas, Maryland, Oklahoma, West Virginia, Arkansas, Iowa, Florida, Idaho, Louisiana, Missouri, South Carolina, Utah, Oregon, South Dakota, Virginia, and Washington.

Though the improvement in all but three States is slight, Oklahoma reports a reduction of 50 per cent., Louisiana 40 per cent., and Idaho 30 per cent.

"The hog situation in general," Dr. Houck said, "seems to be somewhat better than last year. According to our information there has been a considerable increase this year over last year in the amount of immunisation against hog cholera in fifteen of the thirty-one States. There was an appreciable difference in nine States, and seven States report less immunisation than last year."

Dr. Houck spoke of the report from Idaho stating that most of the swine fever of recent months occurred on farms where unimmunised animals had been purchased at public sale grounds. A mid-western veterinarian explained that occasional "breaks" of the serum usually happened when "too little attention is given to the condition of the herd immediately prior to immunisation," the result of giving virus to animals not in fit condition to receive it. In such cases losses often were severe.

Dr. Houck quoted the report of a Nebraska swine observer to the effect that vendors of swine remedies had become increasingly prevalent during the past few years in that State, and that in many cases such agents had caused owners of sick herds to put off securing competent veterinary assistance until too late to save their pigs. In other cases the remedies sold by the agents had actually caused illness. The same observer recommended use of the McLean county system of sanitation approved by the Department of Agriculture, feeding of balanced rations, and employment of a competent veterinarian when disease appeared in the herd.

The Citrus Crop—Harvesting Hints.

The harvesting of early varieties of citrus fruits in early districts will commence in May, and growers would be well advised to have everything in readiness for handling the frut. The picking boxes should be thoroughly overhauled and cleaned and any loose boards on the cases should be securely fastened and protruding nails removed. To secure the best results, it is necessary to keep the skin of the orange in a sound condition—free from abrasions and punctures.

When sizing machines are used, they should be thoroughly examined and any necessary adjustments made. The advent of the sizing machine has done much to assist the grower, and those who have not yet installed a sizing machine in their packing shed should do so without delay. Hand sizing is a slow, costly, and inaccurate way of carrying out the work. Sizing by machines is much more economical.

Noogoora Burr Poisonous for Stock.

Recent experimental work undertaken at Glenfield Veterinary Research Station for the Poison Plants Committee of the Council for Scientific and Industrial Research has demonstrated that Noogoora burr plants are poisonous for stock, but only at an extremely early stage of growth.

The plant as it comes through the ground shows two primary leaves or cotyledons. Their appearance is followed by the development of a stalk and the usual leaf growth. The only stage found to be poisonous has been the cotyledonary stage, and that stage when the plant shows only two leaves and still has the cotyledons attached. The cotyledons soon wither away, and the plants tested after they have disappeared have not been found to be harmful.

Pigs are most susceptible, calves coming next. Sheep may also be poisoned, but are not so susceptible as either calves or pigs.

"Bloom."

Looking at the question of bloom from the showyard standard, a person is occasionally pulled up by someone who asks, "Are judges not generally inclined to lay undue stress on bloom or finish for the time being? Do they always take sufficient account of breeding, character, and the main run of properties which are greater debtors to blood and Nature than to the hands of trainers?" A plain "Yes" or "No" is not enough of a reply to such queries as these. Just as in the showyard itself, one must not be hustled round the subject. A qualified negative to the first and a less qualified affirmative to the second are fair sets-off.

A capable judge will not lose sight of breeding or character. He may go slightly out of his way—in the case of young female animals, for instance—to show his appreciation of discreet feeding; but why should anyone expect him to be generous to the owner of any animal which carries dirt or poverty, or a combination of both, into the ring?—"Live Stock Journal" (England).

Right Type of Pig—American Method of Educating Farmers

With the object of impressing upon pig raisers the necessity of producing a type of pig that is in favour packers in the Middle West of the United States recently exhibited a carload of pigs at the leading shows of the type and finish that best meet their demands.

These pigs weighed about 200 lb. and carried a medium finish, that is to say, the fat on their backs would probably be from 1½ to 2½ inches in depth with a smooth covering of fat over the shoulders, sides, and hams. The pigs showed excellent quality, as was shown by the smoothness in body and conformation, with hair that was smooth and not curly. The bone was of medium size and of good quality.

With a balance between the shoulders and hams, with no falling away along the sides, these pigs had sides that were smooth and fairly deep, with considerable widths of back and loin, although the backs and loins were not so wide as the backs and loins of pigs that were common fifteen years ago. They were rather longer pigs, however, and the jowls were not heavy.

Pig raisers were advised that in order to produce pigs of this kind when finished it would probably be best to begin with a pig that was smooth, of good quality, and having considerable length, with enough depth and width to have a well-balanced pig when at a marketable weight.

The Duroc-Jersey Pig.

In a recent communication from the American Duroc Association, the well-known American "Red" pig, the Duroc-Jersey, is spoken of in highly appreciative terms as—

> "The Duroc, the world's supreme hog."
>
> "The breed that has stood every test and proven superior in Pork Production."
>
> "The breed that outweighs other breeds at every age."

In the 1927 National Swine Show, the Duroc winners in every class outweighed their competitors of other breeds. The average weight of the 80 head winning in all ten classes was 38.2 lb. heavier than their nearest competitor and 176.6 lb. heavier than the lightest breed shown. In the 1928 National Show, the Grand Champion boar was a junior yearling weighing 862 lb., the heaviest junior ever shown at a world's Show.

Win in Feeding Contests.—A Pig Club boy won grand champion in the International Junior Feeding Contest for 1928 with a Duroc barrow. In the California Live Stock and Baby Beef Show in 1928, a Pig Club boy won grand champion with a Duroc barrow.

Win in Ton Litter and Herd Contests.—More Duroc litters have won in Ton Litter State Contests than litters of any other breed. The record of 4,925 lb. in 180 days from a Duroc litter, challenges the world.

In the Colorado State Herd Production Contest in 1928, Duroc herds took first, second, and third prizes. The first prize herd sows each produced 1,889.3 lb. of pork in one litter, one litter reaching 2,592 lb.

THE JOURNAL APPRECIATED.

A Geebung farmer writes (3rd April, 1930):—"I very much appreciate the Journal and have taken it for years. I have also recommended it to other farmers round about my former home at Proserpine. Since coming south to live I have continued that practical advocacy of its usefulness to the man on the land."

Butter Equivalents in Milk and Cream.

The amount of milk required to produce 1 lb. of butter depends upon the fat content of the milk. The butter-fat content of milk varies, the average test being 3.8 per cent. Since .85 lb. of milk fat is sufficient to make 1 lb. of butter it will require approximately 22.4 lb. of milk of a 3.8 per cent. fat to produce .85 lb. of milk fat or its equivalent, 1 lb. butter.

The following indicates the varying amounts required according to the test of the milk:—

25.8 lb. milk testing 3.3 per cent. fat will make 1 lb. butter.
23.7 lb. milk testing 3.6 per cent. fat will make 1 lb. butter.
22.4 lb. milk testing 3.8 per cent. fat will make 1 lb. butter.
21.8 lb. milk testing 3.9 per cent. fat will make 1 lb. butter.

The amount of cream required to make 1 lb. of butter depends upon the fat content of the cream produced in the process of separation.

The cream screw of the separator bowl can be regulated to produce a cream of a desired fat content.

"*The Dairy Produce Act of* 1920" provides that cream delivered to a butter factory during the period April to September, inclusive, shall contain not less than 34 per centum of fat, and that delivered during the period October to March, inclusive, shall contain not less than 38 per centum of fat.

The following indicates the varying amount of cream required according to the test of the cream:—

2.5 lb. cream testing 34 per cent. fat will make 1 lb. butter.
2.24 lb. cream testing 38 per cent. fat will make 1 lb. butter.
2.12 lb. cream testing 40 per cent. fat will make 1 lb. butter.

In Favour of Berkshires.

Writing in his usual informative style, Mr. Norman Williams, a prominent and successful breeder of Berkshire pigs at Wilmot, Tasmania, states that in his opinion we have, in Australia, some of the finest stud pigs in the world, pigs of a quality that would compare with the best in any country, and equally productive, although we could do with further introductions of fresh blood with which to build up and strengthen existing and fresh studs. He states he has recently purchased from Mr. Luke Williams, of Moonah, Tasmania, the winner of the Berkshire Societies' Cup (British), Plumpton Prince, a Berkshire boar of high quality and modern type. He also secured Tarooma Marquis, a champion stud boar; this boar is producing the best pigs Mr. Williams ever bred, fine shoulders, great quality, and perfect type. He sired the winning boar under nine months at Melbourne Show. This boar has sired as many as eight show pigs in one litter from well-bred, good quality pigs.

Moisture in Butter.

Shrinkage occurs when butter is held in storage for several weeks or longer, and is due to loss of water content, chiefly by evaporation. The shrinkage due to evaporation of moisture is influenced by the distribution of the moisture content of the butter. Uniform distribution of the water in the butter is obtained by giving the butter the correct amount of working. When the water is not thoroughly mixed with the fat the loss through leakage and evaporation is increased. When the moisture and fat are so thoroughly worked together that the moisture droplets are finely divided and thoroughly encased in fat the shrinkage is decreased. The object in working butter is to control and evenly distribute the moisture and to prevent mottles and streakiness in butter to which salt has been added. Butter manufactured under modern dairy factory conditions will be firm enough in body to allow of its being sufficiently worked to incorporate the moisture without injury to the body, texture, and general character of a first-grade product.

Pigs and Poetry Appeal to Him.

Thus the ''Livestock Bulletin'' (Sydney):—

No one would suspect that under the strictly utilitarian exterior of Mr. E. J. Shelton, Queensland's senior instructor in pig raising, lies a soul for poetry. Give Mr. Shelton but half a chance, and he will pour into one's ear a glowing account of some sow that has done her duty nobly by raising a litter of seventeen and doing them well. He will talk of ton litters and Durocs, and tuberculosis of the throat, and paralysis, and of all the little parasites that infest the intestines of pigs, both large and small, but one will not hear a word of poetry from him.

When he writes to us, however, he generally slips into the envelope a verse or two, neatly typed out, that has appealed to him, and never are these verses about pigs. Here is one that came a day or two ago:—

''To every man there openeth
  A Way, and Ways, and a Way,
And the high soul climbs the High Way,
  And the low soul gropes the Low;
And in between, on the misty flats,
  The rest drift to and fro;
But to every man there openeth,
  A High Way and a Low,
And every man decideth
  The Way his soul shall go.''

—John Oxenham.

It seemed to us as we read that verse that it put into words Mr. Shelton's philosophy, and the philosophy of every man who tries to leave a herd, or a farm, or a flock, better than he found it. The man who sets himself to build a herd that will average 400 lb. fat a year, or a herd of pigs that will make a large and steady gain, is the man who climbs the High Way. The man who says that ''dairyin' don't pay no how'' gropes along the Low Way.

Mr. Shelton, eager to learn what the other side of the world is doing to make pig raising more profitable, is off to England shortly. Everyone who knows the enthusiastic fellow will wish him well on his adventure. He has decided which way his soul shall go.

Watering the Horse.—Dangers of Impurity.

Horses require anything from 5 to 15 gallons of water a day, the quantity depending on the temperature and the amount of work performed. The water should be as pure as possible, clear in appearance, and free from taste, colour, or smell. Pure water is just as essential to a horse as it is to a man, and it is a mistake to suppose that a horse can drink badly contaminated water with impunity. Water obtained from pools or shallow wells, contaminated with surface drainage, or containing decomposing organic matter, frequently causes diarrhœa, and generally predisposes to colic. Water that contains a large amount of sediment should not be given, as the sediment causes a mechanical irritation of the mucous membrane of the stomach and intestines—i.e., sand colic. When at rest in the stable, water should be given three times a day, and should invariably be given previous to feeding.

This latter point is of considerable practical importance. A horse's stomach is small in proportion to the animal's size, and water does not remain in it, but passes through the stomach and small bowel to the cæcum, or water-gut. If water is given after feeding, besides weakening the digestive juices, a considerable portion of the food in the stomach and small intestines will be washed out in an undigested state, and indigestion and colic may result. Water in small quantities can be given within an hour or so from the completion of feeding, if desired.

After a long journey, a good plan is to water a mile or so before the journey's end, and take the horse slowly in afterwards. This prevents chills and colic, due to the ingestion of a large quantity of water when in an exhausted state. An animal after prolonged exertion or fast work has his system depleted of fluid. He will not eat sufficiently until his thirst has been satisfied; therefore the water should come first, and while the animal is still warm is the best time to give it. After standing, the body temperature falls, and to give cold water freely then is only to intensify the effect of the cold water on the system.

The Australian Soldier—The Man that He Was.

A flood of war "literature" has been let loose on the reading public of the Old Country by malicious and commercial-minded "base-wallahs" who evidently stick at nothing in their exploitation of all kinds of filth and nastiness; and also in their efforts to slander the Australian soldier. What sort of man was the Digger, anyhow? This is how Captain Bean viewed the young countryman of the Commonwealth in "The Official History of Australia in the War of 1914-18":—

All through the war the light horseman tried things by the light of his strong common sense. On a hard-riding advance, when victory depended upon speed, and speed upon a supply of horse-feed, he did not hesitate to help himself to any grain or other fodder possessed by the natives of the country. Orders forbidding such conduct might have been couched in the strongest terms; but when it was a choice between failure through loss of horses, and success to be achieved by the commandeering of fodder, he did not hesitate to flout authority. He dismissed such incidents from his mind with the scornful thought that a General Staff which could not settle trifling affairs of that sort with the natives was not fit for its job, and rode on happy because the bulging nosebag ensured an evening meal for his beloved waler.

The light horseman, with all his unconventional ways and his occasional forcefulness, was at heart distinguished by shyness and reserve. The young Australian countryman leads a simple and peaceful life. He bears himself modestly. One of the first horsemen of the world, and breeding the world's best horses of their kind, he indulges himself in no distinctive horseman's attire. He has none of that picturesque flashness which cowboys of Western America and the Canadian Northwest of a generation ago inherited from the Spanish pioneers of the Pacific slope. A felt slouch hat, a shirt with the sleeves rolled to the elbows, long trousers not particularly made for riding, boots, and very gentle spurs make up his everyday dress. He rides, as a rule, in a plain English hunting saddle, and carries neither lasso nor revolver. A temperate man, his one excess is a harmless celebration at the annual races or agricultural show, or on an occasional visit to the capital city of his State; even then the impelling force is the bursting strength of his youth rather than any disposition for strong drink or unwholesome excitement. Men of all young English countries engage in these occasional sprees, which were in fact a stronger feature of the early pioneering days, when most of the settlers were of British birth, than they are among the native-born. The young countryman of the Commonwealth is neither a hard nor a regular drinker, but, when his rare holiday comes, he engages whole-heartedly in a joyous demonstration. On occasion he did this at Cairo, and at other places abroad, and his high spirits and forceful, but as a rule quite harmless, carnivals sometimes led to misunderstanding in the minds of men who did not know the native wholesomeness of his life at home. Any study of the slender "crime" sheets of the light horseman throws a sure light upon his character. The worst offence discoverable there (with the exceptions inevitable in a body of many thousands of men) is that of occasional physical violence, of blows struck in anger. But those tell-tale sheets are clean of all morbid or unmanly offences, and remarkably free from charges of desertion, cowardice, or disobedience to orders in action.

Pigs for Export—Types Required for British Pork Market.

Although Australia does not export pork to Great Britain, it would appear that the present is an opportune time for experiments in this direction, provided the right type of pig is available to meet the demand of the public. Apparently the British farmers have not been able to fill the requirements, as loins of pork are being placed on the market from the United States.

Mr. S. Pulham, one of the leading London butchers, who frequently addresses farmers' meetings upon the needs of the markets, speaking at Guildford (England) recently, said that the crosses he favoured were the Large White and the Middle White and the Large White and the Berkshire. Above all (he said), the demand was lean meat and a wide and thick loin, and for the London trade a pig was required that weighed 80 lb. Irish farmers had not been so lax as English in the production of pork. When the embargo was put on, some enthusiastic salesmen at Smithfield went to Holland, and obtained Dutch slaughtermen and feeders and took them to Ireland, and during the last three years they had produced a large percentage of the pigs sold at Smithfield. Farmers would rather have a uniform price year in and year out, and if they could produce pigs profitably at 9d. or 10d. per lb. the butchers could make a reasonable profit out of it.

Preventing Sterility in Pigs.

Sterility in pigs is difficult to cure, but most forms of it can be prevented by proper management, says a contemporary, and the following points are important:—

(1) Fertility is heritable, therefore always select breeding stock from large litters.

(2) Breeding sows must have more protein and calcium than fattening stock in order to build up flesh and bone in their young. The important sources of supply of these are meat and protein meal, milk, and leguminous pastures.

(3) Exercise is essential for regular production.

(4) Show condition sometimes causes sterility, but this is when the pigs are over-fat and lack exercise.

(5) Exposure in winter will delay breeding.

(6) Contagious abortion is spread through infected afterbirth, dead piglings, and discharge contaminating the food, water, and bedding.

(7) The sow which has aborted is a danger to the herd, and should be separated and fattened.

(8) A common disease causing sterility is septic inflammation of the uterus. This usually causes a slight dirty white discharge. It is waste of time to try and treat such cases.

Co-operative Buying—Profitable Enterprise of Taree Farmers.

Discussing at a recent gathering at Dungog the subject of co-operative buying of farm requirements, the president of the Central North Coast Branches of the Agricultural Bureau of New South Wales deprecated the old principle of "take what I give you for what you sell, and pay what I ask you for what you have to buy," observing that in view of the decreasing margin of profit it was more than ever advisable for the farmer to consider the advantages of the pool system of buying. Farmers realised that they bought too dearly and sold too cheaply, said the speaker, but they seemed unready to accept new methods of selling and to be content to continue to buy in the old way small quantities from the middleman. Interesting details were given of the operations of the Taree Sub-district Council of the Bureau, which was registered as a trading society under the Act.

Although the society had come into existence at a bad time, said Mr. Richardson, just after the floods of February, 1929, there was a turnover of £600 during the first six months. Maize at that time was costing 24s. 6d. a bag locally, but when the society's supplies came forward from Queensland it was possible to sell for 18s. a bag. The opposition then brought down their price to 17s. 9d. for ten-bag lots, and the society responded by quoting at the same figure for single bags. Fertiliser was sold at 9s. 6d., as compared with 12s. 6d. per bag in quantity locally; lucerne seed at 2s. as compared with 2s. 6d. The same advantage in prices applied to wheat and oats, but in the absence of a shed it was at first only possible to buy in truck lots, which had to be unloaded quickly to prevent charge for demurrage. At the suggestion of the local railway authorities, it was decided to build their own shed, one with a floor space of 24 by 16 feet being erected. In less than three months this had had to be doubled in size, and it had again been found too small.

During the six months ended December, 1929, the cash takings had been £4,800, and the following goods were handled:—1,200 bags maize; 600 bags chaff (sold at 7s. as against 10s. locally); 1,800 bags bran, pollard, and feed; 500 bags seed potatoes (from Crookwell, sold at a price which meant a saving of 7s. to 8s. per bag); 1,250 bags fertiliser. Six trucks of rice had also been bought as feed for pigs and poultry. Fencing wire was sold by the society at a price 4s. 6d. lower than down town, and though farming implements had to be sold at the manufacturers' price, the advantage came back to members in the form of bonus. Insurance was handled, and cream cans were also sold at a saving. When in due course the potato crop was harvested, the society handled the product for its members. When the price was down to £7 per ton in Sydney, £9 10s. had been obtained at Narrabri. There were local growers who were not satisfied with this; these, holding back, had had to accept £4 10s.

They were thus securing goods and selling them direct and cutting out the middleman, said Mr. Richardson. Their membership consisted only of actual farmers, and was constantly growing.

Congratulating the speaker on his address and Taree farmers on their enterprise, the Director of Agriculture (New South Wales), Mr. A. H. E. McDonald, said there was no doubt that the farmer was the loser by not looking after certain jobs himself.

The World's Live Stock.

Which country has the greatest number of live stock? According to the figures of the last complete year in all the countries for the purposes of comparison, there are 146,580,718 in British India, as against 67,835,000 in Russia, 55,681,000 in the United States of America, and 37,064,850 in the Argentine. In sheep Russia leads by 120,237,000, with 108,864,805 (Australia) second. Pigs are most plentiful in the United States with 60,200,000 (U.S.A.), Germany next with 22,800,318. The figures for Great Britain and Ireland are 12,230,042 cattle and 28,328,409 sheep.

Dingo Destruction,

The return of operations of Dingo Boards throughout the State for the year 1929 has now been made available to the Minister of Agriculture and Stock (Mr. H. F. Walker). Under existing legislation the eradication of the dingo and fox is undertaken by thirty-six boards, who make a levy on stockowners to meet estimated expenditure incurred in the payment of bonus for the destruction of these pests and for any administrative expenses.

Since the inception of legislation in 1877 dealing with dingo and marsupial destruction, approximately 1,040,000 dingo scalps have been paid for by boards, and the bonus payments have totalled about £1,200,000. Government assistance has been granted to the boards in the form of an endowment totalling over £350,000. During the year 1929 approximately 30,000 dingo scalps and 14,000 fox scalps were paid for.

The Minister, although pleased to call attention to the effective operations of the various boards, is concerned at the expenses of administration incurred. He is of opinion that in certain instances these expenses are out of all proportion to the volume of dingo destruction, but wishes it to be distinctly understood that this does not apply to every board in the State. It is noted that last year the administrative expenses of the boards totalled approximately £9,000. A case can be cited in one district where the expenses of administration reached a total of £1 9s. 8d. for each dingo scalp secured, and this excluded the bonus payment on the scalp of 15s. In the case of six other boards the administrative expenses, apart from the bonus payment, exceeded 10s. for each dingo scalp paid for.

Doubtless, the Minister added, this matter will be given serious consideration by the commission of inquiry which it is proposed to appoint to deal with the eradication of animal pests.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

OUR CHILDREN'S TEETH.

Primitive man has always had good teeth. He still has. The teeth of civilised man have not been so good. During the last century his teeth have been getting rapidly worse, and now in Australia we have the worst teeth that the world has ever seen. There has been nothing inevitable about this; it has all resulted from want of care based on want of knowledge. The condition of his teeth is civilised man's own fault, or the fault of his mother, or more rightly, I think, the fault of those who should have instructed the mothers how to look after their children's teeth.

Evils of Early Neglect.

For the most of the harm is done in infancy and childhood. As a people we expend a considerable sum of money on our teeth, but it is mostly spent much too late to obtain the best results. Nothing done in later life can fully repair the damage caused by neglect in these early years. We can easily see for ourselves how many young men and women have very visible gold-scarred teeth. If we could examine their back teeth, we should find that these were still worse, and many are even wearing plates with artificial dentures. Going still further back our Medical Inspectors have found that on entering school about six years of age only about one child in ten has teeth without defects, and many have very serious defects. We are, therefore, dealing with a national problem.

Children Should Never be Allowed to Suffer Toothache.

It must not be supposed that bad teeth are merely a local and unimportant trouble. Tooth-ache, from which children should never be allowed to suffer, is not the only result. Abscesses of the teeth, which are common among our children, may have serious effects on their general health. But the most serious consequences occur in later life, and comprise such a long list of chronic and crippling diseases that to enumerate them would be to write the headlines of a medical treatise dealing with the whole human body. Bad teeth and good health are, on a large scale, incompatible. A child with defective teeth is not getting the best start in life.

What Should be Done.

We must be brief, and lengthy explanations would be here out of place. Let us be severely practical, and give no more than a concise outline of what should be done, so simple that it can be understood by all parents, sufficiently broad to deal thoroughly with this great evil, and yet (at least for the most part) not beyond the power of most parents of intelligence and good will.

(1) At six years of age the trouble has, as a rule, already been there for one, two, or three years. Therefore, all mothers should carefully watch their children's teeth, and not forget all about them after they are two years old. Every child should have his teeth inspected by a dentist before he is four years old and once a year after that. Mothers should know that the first permanent teeth appear behind the milk teeth at six years of age. These are the most important teeth in the mouth; they are intended to last a lifetime, and often they are damaged at the very start. A skilful dentist will preserve them.

(2) At three years of age the child should be taught how to brush his teeth gently, as advised in the Queensland Mothers' Book. The object of brushing is to clean the teeth from particles of food. We do not advise the use of any tooth-paste or tooth-powder.

(3) The milk teeth are formed before birth, and depend on the health and food of the mother. This is a matter for ante-natal care. The permanent teeth are formed in the jaws during the first three years of life, and of these the first year is most important. Therefore every effort should be made to keep the baby on the breast so that he may have the best food possible. If, unfortunately, he has to be partly or wholly artificially fed the greatest care must be taken, and the mothers should always have skilled advice. This she may get at a Baby Clinic. A poorly nourished or sickly baby may attain good health in later years, but his permanent teeth may have been irretrievably spoilt.

(4) Mothers must learn that human teeth were made for hard biting, and without hard biting the child cannot grow strong teeth. At nine months old the baby should be taught to bite a finger of hard-baked bread. He soon learns to bite it, and not to try to swallow big lumps. Hard-baked bread is nicer and more digestible than soft bread and much better for children. It is a sad thing to see small children fed entirely with soft stuff, until at three years old some have such poor teeth that they cannot eat a crust.

(5) Most important is the way children are fed. Teeth decay because soft particles of bread, cake, biscuits, and such things lodge in and between the teeth and gradually destroy their hard covering. Consequently, children who are fed with these things between meals cannot have good teeth, for their teeth are never free from these particles. At their meals children should have a little fruit, raw or cooked, to finish up with, or some acid jam on their bread and butter, or lemon or other acid drinks. Children like all these things, and they excite a flow of saliva which washes away these food particles. Brushing the teeth after meals is also useful.

(6) All fruits contain sugar. Sugar in small quantities not only makes food nice, but is itself a valuable food. Chewing sticks of sugar-cane is one of the best ways of strengthening teeth. But we have formed the habit of giving concentrated sugar which forms a sticky deposit on the teeth and destroys them. Soft sweetmeats such as chocolate creams are the most destructive of all. Those silly people who give children sweets to please themselves, are not true friends of children.

Simple Rules Requiring Resolution in Observance.

These rules for strengthening and preserving children's teeth are really very simple. But the mother who tries to follow them will find many lions in her path. They are habit, custom, indifference, foolish traditions, silly sentimentalism, commercial enterprise, bold advertisements, shop window displays, bad example, and many more. To fight these will require some resolution.

WHITEWASH ON THE FARM—A USEFUL FORMULA.

Whitewash has a wide application to farm use, and deserves a much greater popularity than it at present enjoys. Its ingredients are inexpensive and readily obtained, it is not difficult to make, and it is easy to apply. In addition to these advantages it protects the surfaces to which it is applied, brightens up dark interiors, and is sanitary. Whitewash may be coloured, provided that light tints and shades are used and that the pigments are not affected by lime. Among such are yellow ochre, raw and burnt umber, and raw and burnt sienna.

The surface to be whitewashed should be just as clean as one that is to be painted, and it is a first essential to good results that all dirt, dust, grease, and scaly material be removed before there is any attempt to apply the wash. This implies a liberal use of scrapers and stiff brushes. When the cleaning is finished and the surface dusted, it is well to dampen it slightly just before applying the wash.

The following formula is recommended by the Supervising Architect of the New South Wales Department of Agriculture:—

Obtain, if possible, large pieces of fresh lump lime, place them in a very large bucket or other suitable container, and into this pour hot water. Cold water will do, but hot water is better as it hastens the slaking. The lime will start to boil and break up. Keep it covered all the time with about half an inch of water. This is important, for if whilst the lime is slaking it is allowed to rise up above the water in a dry powder it will "curdle," a condition tolerated only by inexperienced and indifferent workmen. Before the lime commences to boil fiercely, add tallow or common fat in the proportion of about 1 to 2 lb. to 7 lb. of lump lime. This makes a good binder which will prevent the wash from rubbing off. If desired, a little yellow ochre may also be added, which will give a cream or buff tint according to the quantity used. When the lime is thoroughly slaked it should be stirred and sufficient water added to make it a little heavier than, say, milk, after which it should be strained and, if desired, may be applied whilst hot.

KITCHEN GARDEN.

Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; and in cool districts horse radish can be set out.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

A REMINDER TO ONION GROWERS.

Onion seed growers should, by this, have gone through their selected onions with the object of picking out the best keepers for the production of seed. The bulk of these onions should have been selected, previous to storing, for early maturity and variety characteristics. At the final selection bulbs that are soft or prematurely shooting, or those showing any indication of being bad keepers, or that are diseased, should be discarded.

The bulbs should be planted in rows at least 3 feet apart and spaced 2 feet apart in the rows. A handy position well protected from the boisterous winter winds should be selected for the growing of onion seed.

FLOWER GARDEN.

No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool, moist springtime to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the summer bedding plants may be propagated.

Sow first lots, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground. Many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondi*, stocks, wallflower and zinnias, &c., may be sown either in boxes or open beds. Mignonette is best sown where it is intended to remain. Dahlia roots may be taken up and placed in a shady situation out of doors, plant bulbs such as anemones, ranunculus, fresias, snowflakes, ixias, watsonias, iris, narcissus, daffodil, &c. The Queensland climate is not suitable for tulips.

To grow these plants successfully it is only necessary to thoroughly dig the ground over to a depth of not less than 12 inches, and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should be raked over smoothly so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave the plants (if in the border) at least 4 to 6 inches apart.

Farm Notes for June.

FIELD.—Winter has set in, and frosts will already have been experienced in some of the more exposed districts of the Maranoa and Darling Downs. Hence insect pests will to a great extent cease from troubling, and weeds will also be no serious drawback to cultivation. Wheat sowing should now be in full swing, and in connection with this important operation should be emphasised the necessity of at all times treating seed wheat by means of fungicides prior to sowing. Full directions for "pickling" wheat by copper carbonate treatment are available on application to the Department of Agriculture, Brisbane. Land intended for the production of early summer crops may now receive its preliminary preparation, and every opportunity taken advantage of to conserve moisture in the form of rainfall where experienced; more particularly so where it is intended to plant potatoes or early maize. Where frosts are not to be feared the planting of potatoes may take place in mid-July; but August is the recognised month for this operation. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them under cover and in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sandpit. Before pitting, spread the tubers out in a dry barn, or in the open if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size, and finally cover with either straw or fresh hay. The sand excludes the air, and the potatoes will keep right through the winter. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas.

Cotton crops are now fast approaching the final stage of harvesting. Growers are advised that all bales and bags should be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus address labels.

Orchard Notes for June.

THE COASTAL DISTRICTS.

The remarks that have appeared in these notes for the past two months apply in a great measure to June as well, as the advice that has been given regarding the handling, grading, packing, and marketing of the citrus crop still holds good. As the weather gets cooler the losses due to the ravages of fruit flies decrease, as these insects cannot stand cold weather, and consequently there is only an odd one about. The absence of flies does not, however, permit of any relaxation in the care that must be taken with the fruit, even though there may be many less injured fruit, owing to the absence of fruit-fly puncture, as there is always a percentage of damaged fruit which is liable to speck, which must be picked out from all consignments before they are sent to the Southern States if a satisfactory return is to be expected. If the weather is dry, citrus orchards must be kept in a good state of tilth, otherwise the trees may get a setback. Old worn-out trees can be dug out and burnt; be sure, however, to see that they *are* worn out, as many an old and apparently useless tree can be brought round and made to bear good crops, provided the trunk and main roots are still sound, even though the top of the tree is more or less dead. The whole of the top of the tree should be cut off and only the trunk and such sound main limbs left as are required to make a new head. The earth should be taken away from around the collar of the tree, and the main roots exposed, any dead roots being cut away and removed. The whole of the tree above ground and the main roots should then be dressed with a strong lime sulphur wash or Bordeaux paste. The main roots should be exposed for some time, not opened up and filled in at once. Young orchards can be set out now, provided the ground is in good order. Don't make the mistake of planting the trees in improperly prepared land—it is far better to wait till the land is ready, and you can rest assured it will pay to do so in the long run.

When planting, see that the centre of the hole is slightly higher than the sides, so that the roots, when spread out, will have a downward, not an upward, tendency; set the tree at as nearly as possible the same depth as it was when growing in the nursery, cut off all broken or bruised roots, and spread those that remain evenly, and cover them with fine top soil. If the land is dry the tree should then be given a good watering, and when the water has soaked in the hole can be filled up with dry soil. This is far better than watering the tree after the soil has been placed round it and the hole filled up. Custard apples will be ripening more slowly as the nights get colder. If the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and be of no value. This can easily be overcome by subjecting the fruit to artificial heat, as is done in the case of bananas, during the cooler part of the year, when it will ripen up properly and develop its flavour. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

Pineapples, when at all likely to be injured by frost, should be protected by a thin covering of bush hay or similar material. The plantation should be kept well worked and free from weeds, and slow-acting manure, such as bonedust or island phosphates, can be applied now. Lime can also be applied when necessary. The fruit takes longer to mature at this time of the year, consequently it can be allowed to remain on the plant till partly coloured before gathering for the Southern markets, or can be fully coloured for local use.

Banana plantations must be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now means small fruit later on. Bananas should be allowed to become full before the fruit is cut, as they will carry all right at this time of the year; in fact, there is more danger of their being injured by cold when passing through New England by train than there is of their ripening up too quickly.

Bear in mind the advice given with regard to the handling, grading, and packing of the fruit. It will pay you to do so. Land intended for planting with bananas or pineapples during the spring should be got ready now.

Strawberries require constant attention, and, unless there is a regular and abundant rainfall, they should be watered regularly. In fact, in normal seasons an adequate supply of water is essential, as the plants soon suffer from dry weather or strong, cold westerly winds. Where not already done, vineyards should be cleaned up ready for pruning—it is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

All kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt area. Don't be frightened to thin out young trees properly, or to cut back hard—many good trees are ruined by insufficient or bad pruning during the first three years. If you do not know how to prune, do not touch your trees, but get practical advice and instructions from one or other of the Departmental officers stationed in the district. In old orchards do not have too much bearing wood; cut out severely, especially in the case of peaches, or you are likely to get a quantity of small unsaleable fruit. There are far too many useless and unprofitable fruit trees in the Granite Belt area, which are nothing more or less than breeding-grounds for pests, such as fruit fly, and are a menace to the district. Now is the time to get rid of them. If such trees are old and worn out, take them out and burn them, but if they are still vigorous, cut all the tops off and work them over with better varieties in the coming season—apples by grafting in spring and peaches and other stone fruits by budding on to young growth in summer. Planting can start now, where the land is ready and the trees are to hand, as early planted trees become well established before spring, and thus get a good start. Be very careful what you plant. Stick to varieties of proved merit, and few at that, and give so-called novelties and inferior sorts a wide berth. Take the advice of old growers, and do not waste time experimenting with sorts that have probably been tested in the district and turned down years ago. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour and badly prepared land.

Slowly acting manures—such as bonedust, meatworks manure, or island phosphates—can be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when they start growth in spring. Lime can also be applied where required. Badly drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees can be pruned now, and vines can be pruned also in any district where there is no danger from late frosts, and where this can be done the prunings should be gathered and burnt, and the vineyard ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the Western districts. The trees should be watered if they show signs of distress, otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should be cut by this time, as, if allowed to remain longer on the tree, they only become overgrown and are more suitable for the manufacture of peel, whereas if cut and cased now they will keep in good order so that they can be used during the hot weather.

QUEENSLAND SHOW DATES, 1930.

Mitchell: 7th and 8th May.
Mundubbera: 7th and 8th May.
Boonah: 7th and 8th May.
Murgon: 8th to 10th May.
Blackall: 13th to 15th May.
Roma: 13th and 14th May.
Goomeri: 14th and 15th May.
Gayndah: 14th and 15th May.
Wallumbilla: 20th and 21st May.
Ipswich: 20th to 23rd May.
Springsure: 21st and 22nd May.
Kilkivan. 21st and 22nd May.
Biggenden: 22nd and 23rd May.
Maryborough: 27th to 30th May.
Emerald: 28th and 29th May.
Toogoolawah: 30th and 31st May.
Marburg: 3rd June.
Childers: 3rd and 4th June.
Gin Gin: 5th to 7th June.
Bundaberg: 12th to 14th June.
Lowood: 13th and 14th June.
Miriam Vale: 16th and 17th June.
Gladstone: 18th and 19th June.
Mount Larcom: 20th and 21st June.
Rockhampton: 25th to 28th June.
Pine Rivers: 27th and 28th June.
Mackay: 1st to 3rd July.
Kilcoy: 3rd and 4th July.
Gatton: 9th and 10th July.
Woodford: 10th and 11th July.
Townsville: 8th to 10th July.
Cleveland: 12th July.
Barcaldine: 15th and 16th July.
Charters Towers: 16th and 17th July.
Caboolture: 17th and 18th July.
Rosewood: 18th and 19th July.
Ithaca: 19th July.
Laidley: 23rd and 24th July.
Nambour: 23rd and 24th July.
Esk: 25th and 26th July.
Ayr: 25th and 26th July.
Maleny: 30th and 31st July.
Royal National. 11th to 16th August.
Crow's Nest: 27th and 28th August.
Imbil: 3rd and 4th September.
Malanda: 5th and 6th September.
Gympie: 10th and 11th September.
Redcliffe: 12th and 13th September.
Beenleigh: 19th and 20th September.
Rocklea: 27th September.
Kenilworth: 27th September.

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ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	May, 1930.		June, 1930.		MOONRISE. May, 1930.	MOONRISE. June. 1930.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.21	5.17	6.39	5.2	a.m. 8.33	a.m. 10.29
2	6.21	5.17	6.39	5.2	9.36	11.19
3	6.22	5.16	6.40	5.2	10.40	11.59
4	6.22	5.16	6.40	5.1	11.41	p.m. 12.36
5	6.23	5.15	6.41	5.1	p.m. 12.35	1.8
6	6.23	5.14	6.41	5.1	1.21	1.40
7	6.24	5.14	6.42	5.1	1.57	2.12
8	6.25	5.13	6.42	5.0	2.32	2.46
9	6.25	5.13	6.42	5.0	3.6	3.21
10	6.26	5.12	6.43	5.0	3.38	4.3
11	6.27	5.11	6.43	5.0	4.10	4.51
12	6.27	5.11	6.43	5.0	4.45	5.52
13	6.28	5.10	6.43	5.0	5.23	6.35
14	6.28	5.10	6.44	5.0	6.9	7.30
15	6.29	5.9	6.44	5.0	6.58	8.25
16	6.30	5.8	6.44	5.0	7.50	9.20
17	6.30	5.8	6.44	5.1	8.44	10.15
18	6.31	5.7	6.45	5.1	9.39	11.9
19	6.31	5.7	6.45	5.1	10.35	...
20	6.32	5.6	6.45	5.1	11.31	a.m. 12.1
21	6.33	5.6	6.45	5.2	...	12.55
22	6.33	5.5	6.46	5.2	a.m. 12.11	1.47
23	6.34	5.5	6.46	5.2	1.18	2.51
24	6.35	5.4	6.46	5.2	2.12	3.56
25	6.35	5.4	6.46	5.3	3.8	5.1
26	6.36	5.3	6.46	5.3	4.6	6.9
27	6.36	5.3	6.47	5.3	5.8	7.16
28	6.37	5.2	6.47	5.3	6.16	8.17
29	6.38	5.2	6.47	5.3	7.22	9.13
30	6.38	5.1	6.47	5.3	8.29	9.55
31	6.39	5.1	...	...	9.32	...

Phases of the Moon, Occultations, &c.

6 May	☾ First Quarter	2 53 a.m.
13 ,,	○ Full Moon	3 29 a.m.
21 ,,	☽ Last Quarter	2 21 a.m.
28 ,,	● New Moon	3 36 p.m.

Perigee, 5th May, at 4.48 a.m.
Apogee, 19th May, at 5.54 p.m.
Perigee, 31st May, at 3.36 p.m.

On the 13th the Moon will occult Delta Scorpii, magnitude 2·7. The times at which the star will disappear and reappear will depend upon the position of the observer and be earlier in the south than in the north of Queensland, generally speaking. The brightness of the full Moon will make telescope or binoculars necessary. Between extreme positions in the south-east and north-west observers should be ready to watch the Moon approaching the star from the west as much as three hours before midnight.

On the 16th the Moon will be passing above Saturn at a distance of 6 degrees, the length of the Southern Cross, about 2 a.m.; the position in the sky being about north-north-east.

Venus will be passing from west to east of Jupiter apparently at a distance of nearly three diameters of the Moon to the north. When visible they will be low down in the east-north-east, near daybreak.

On the 20th Mercury will be passing from the east to the west side of the Sun at a distance of rather more than the diameter of the Moon.

When the Moon passes Mars on the 25th at midday, they will be over in the north-west and may be visible with slight optical aid, if the eyes are well screened from the Sun.

Mercury will set at 6.17 p.m. on the 1st and on the 15th only 25 minutes after the Sun.

Venus will set at 6.28 p.m. on the 1st and at 6.41 p.m. on the 15th.

Mars will rise at 3.40 a.m. on the 1st and at 3.35 a.m. on the 15th.

Jupiter will set at 7.35 p.m. on the 1st and at 6.53 p.m. on the 15th.

Saturn will rise at 9.17 p.m. on the 1st and at 8.20 p.m. on the 15th.

4 June	☾ First Quarter	7 56 a.m.
11 ,,	○ Full Moon	4 12 p.m.
19 ,,	☽ Last Quarter	7 0 p.m.
26 ,,	● New Moon	11 47 p.m.

Apogee, 16th June, at 10.54 a.m.
Perigee, 28th June, at 1.18 p.m.

Mercury will reach its greatest distance, 23 degrees west of the Sun, on the 15th, when it will be visible in the east shortly before sunrise.

Jupiter will be behind the disc of the Sun on the 20th, but at a distance of 483 million miles. If the Moon were in the place of the Sun an occultation would occur. In the case of the Sun no times of disappearance and reappearance can possibly be noted.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXIII. 1 JUNE, 1930. PART 6.

Event and Comment.

Facts and Figures.

STATISTICIANS of the Commonwealth and State services assembled in Brisbane in the course of the month for their annual conference, and much useful information was made available as a result of their deliberations. Appreciation of this service to the community was expressed by the Minister of Labour and Industry, Mr. Hubert E. Sizer, when he said at a social function in connection with the conference that if ever there was a stage in Australia's progress when the people needed the guidance that could be given them only by the enthusiasm and work of the statisticians it was now. We as a people have embarked on a career of attempting to establish high standards and of teaching the rest of the world how to live. The fact that the conference had met in Brisbane was rather appropriate, for the Government had taken full cognisance of the value of the work that statisticians could do. The people generally had not yet come to appreciate how much statistical information could help them in dealing with economic problems; there was still a big majority of people who would not face facts. If the conference were able to correct that position it would be the means of radiating light among the people in forming public opinion on the right lines, which would mean a tremendous advantage to the nation in the years to come. The Government had no doubt that good results would be the outcome of the establishment of the Bureau of Statistics with Professor Brigden at the head. In the progress now being made we would need statistical information more and more, and the work of the statisticians in the present age would be tremendously magnified.

Queensland an Ideal State.

ACKNOWLEDGING Mr. Sizer's appreciative remarks and his correct appraisal of the value of the systematic collection of statistics and the economic deductions to be made from them, Mr. C. H. Wickens, Commonwealth Statistician and Actuary, said that he had heard of the magnificence of Queensland and of the warm-heartedness of the people, but since coming here he was satisfied that what he had heard was only half. The action of the Queensland Government in appointing a Director of Economics would have the approval of all statisticians, and he congratulated the Government on its selection of Professor Brigden. It always had appeared to him that Queensland was the ideal State in Australia, and he felt that it would occupy a leading position in the course of time. It had developed rapidly, and of the big States—Western Australia, South Australia, and Queensland—it had the largest area of usable land available. One of the purposes for which statistical data had been used had been the determination of wages, but in this regard he made a plea on behalf of the statisticians that they should not be held responsible for the fixation of wages. They were merely responsible for the gathering of information. The fact that the Queensland Government had appointed a Director of Economic Research would mean that the figures compiled by the statisticians would be put to better use than hitherto. He did not want to depreciate the good work of Mr. George Porter (Queensland Registrar-General) or the other statisticians, but he believed that much of the work was essentially that of an economist.

The Science Congress.

BIENNIALLY the Australasian Association for the Advancement of Science holds a congress, and Brisbane was the venue for the 1930 gathering, which opened on 28th May. That the success of the Association had far exceeded the expectations of the founder (the late Professor Liversidge, formerly of Sydney) was evident by the assembling in Brisbane of eminent scientists from every important centre of the Commonwealth and the Dominion of New Zealand. The main object of the Association is to bring together, from time to time, scientific workers from both dominions to discuss investigations on which they are engaged, as well as to stimulate general interest in research and create scientific opinion. The co-ordination of scientific research is also sought. At the conference valuable scientific and technical papers were read, and those bearing on rural problems will be subjects of extended notice in these pages in due course. Through public lectures and the Press, public interest was aroused in the latest researches of science. Largely as an outcome of the Association's activities the Council of Scientific and Industrial Research was constituted, and this body, with headquarters at Melbourne, has helped to co-ordinate and to a great extent direct the practical application of science throughout the Commonwealth. In Queensland, for example, it is specially interested in the recent developments in the eradication of prickly-pear which have demanded long, sustained, and much patient work by eminent entomologists. Other problems in course of investigation are the discovery of an insect enemy of the sugar-cane beetle, which would be of vast value to the sugar industry; the eradication of bunchy-top in bananas and remedies for other plant diseases. The best method of preserving meat, fish, fruits, and other perishable produce is also a subject of inquiry by members of the Association.

Another point of especial interest to Queensland was an account submitted to the Congress of studies of the life and conditions of our surviving aborigines. Pasture management, improvement, and research problems, all of peculiar interest to Queensland, were also discussed. Other matters affecting primary industry in Queensland that came within the range of the congressional programme were fodder conservation, stock nutrition, Australian tobacco, soil characteristics, cereal yields, pasteurisation in the dairying industry, wheat statistics, maize-breeding, lucerne-breeding, hybridisation of oats, cultural problems, field experiments, forestry, power alcohol, pests and parasites in sheep, and agricultural economics. The Congress was successful from every point of view and the outcome of its proceedings must have a large influence on the better understanding, if not the solution, of many of our present problems.

The Gospel of Work—Sense of Service—No Room for a Leisured Class.

REVIEWING the report of the Central Technical College recently, His Excellency the Governor, Sir John Goodwin, said that it was more than satisfactory; it was really excellent, for it revealed a state of affairs and a record of achievement on which all concerned deserved to be congratulated. It was gratifying to know that the year was a record one, and in addition to the results gained by study, he sincerely congratulated the girls on their successes in physical culture, swimming, and first-aid work. He strongly held that only the best results could be obtained from the intellect if the body were sound and healthy. He was glad to know that the instruction in wool-classing was of such a really practical nature. The work carried out by the college was of an infinitely broader and more far-reaching character than could be represented by a simple record of honours obtained, of diplomas awarded, or of passes secured, important though these were. The college was teaching the most important thing of all, and that was the habit of work.

There was no more contemptible being than one who devoted himself entirely to the pursuit of pleasure. Indeed there was no greater slavery than service to one's own pleasure. He held the very firm conviction that even if individuals were so endowed with the world's goods that work for a livelihood was not a necessity, yet if they were at all worthy of their manhood or citizenship, they would have a feeling of duty to their fellows, a real sense of service, and that sense would compel them to devote some portion, at least, of their lives to the welfare of their fellow men. Service embraced all that was best in mankind. There was no place in the present workaday world for a leisured class or for a leisured individual.

''We may feel thankful and happy,'' concluded His Excellency, ''that the future men and women of Queensland are being taught to be workers and not permitted to be idlers, that all the students here are being so moulded and taught that they will become worthy citizens of their great State of Queensland.''

Poisonous Plants and Livestock.

LECTURING on poisonous plants in relation to livestock before the Science Congress, Dr. H. R. Seddon, Director of Veterinary Research, New South Wales, said that the subject was of considerable interest to workers in more than one science in Australia. He used the general term, ''poison plant,'' to include not only plants that were actually poisonous, but those which in any way disturbed the health of stock. Two methods of determining the poisonous nature of a plant were:—(1) Feeding the plant to the animal or a species reputed to be poisoned by it; (2) discovering by chemical analysis that, in a quantity of the plant such that an animal might consume, there were present some identifiable chemical substances in such a quantity that it would have poisonous effects. Were the active principles of our poisonous plants better known, the latter test might be availed of more than it was. In some instances, the quantitive test was the only means of determining the poisonous nature of the plant. The fact that a plant was poisonous to one class of animals did not mean that it was poisonous to others. Factors which influenced variation in the toxicity of a plant were locality, season, stage of growth, environment of the animal (exposure to sunlight, and exercise), and the breed and colour of an animal. The lecturer emphasised the importance of the exact botanical determination of plants known to be, or suspected of being, poisonous. Experience had taught that vernacular names varied considerably, and that plants at one time believed to be of the same species, might, on further investigation, prove to be different botanically.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director, Bureau of Sugar Experiment Stations.

PART VI.

(b) Review of the Industry since Federation.

(Continued.)

IN the last number it was stated that the sugar industry was divided on the question of whether it was better to remain under Commonwealth control or revert to the State. The State politicians were rather keen on the industry being under State laws and regulations, while some of the Commonwealth politicians uttered dismal forebodings as to what would happen if the Commonwealth gave up control, and prophesied that the industry would be glad enough to come back again to Federal control once more. This prophecy was realised during the war period and for some years thereafter, for the reason that the Commonwealth after all controlled the tariff, and Price Boards in the Southern States were unduly depressing sugar prices.

In 1911, the Commonwealth Government decided to appoint a Royal Commission to inquire into matters relating to the sugar industry of Australia. Amongst other matters submitted to the Commission were "The operation of the existing laws of the Commonwealth affecting the sugar industry and any Commonwealth legislation relating to the sugar industry which the Commission considered expedient to recommend."

The Commission in their report (made in 1912) said the bounty regulations had served useful purposes in the past in promoting the white labour policy, and in improving the wage standard, but that the progress of events had materially diminished the value of the bounty and excise system. For practical purposes the transformation in the fields from coloured to white labour was virtually an accomplished fact as 94 per cent. of the labourers were white. The bounty system in conjunction with the excise duty had been a source of revenue to the Commonwealth Treasury, and the Commission were unable to see any adequate justification for a tax on the sugar industry. By a great body of the growers the bounty regulations were regarded as irksome in their practical working. A much more serious objection was that the bounty regulations were partial in their operation. They applied only to the growers, leaving the employee of the millers and refiners unprotected. It was an obvious anomaly that the one class of profit-earners who got the least return for the capital they invested in the sugar industry was the one class which was subject to the control of the bounty regulations. As a result of these, a certain amount of discretionary power was left in the hands of the Government of the day. This appeared to be a grave objection, it invited the intrusion of political influence and introduced an element of instability into the industry.

As far as Queensland was concerned the most preferable method of cutting out the bounty and excise regulations would be the direct prohibition by legislation of the employment of coloured labour in the canefields, and the Commission understood that the Queensland Government were prepared to act in the direction indicated. The maintenance of standard wages and conditions of labour could be, and ought to be, secured by legislation (either Commonwealth or State) embracing the whole of the industry and not applying, as the bounty regulations apply, to one selected portion of the industry. The Commission recommended:—

> "That the bounty and excise be abolished provided that the Commonwealth Government, by co-operation with the States or otherwise, take whatever steps may be necessary to promote the white labour policy and to ensure the maintenance of a living wage in the sugar industry generally."

The Queensland Premier had already advised the Commonwealth Government that if the Excise and Bounty Acts were repealed he would be prepared to submit legislation for the exclusion of coloured labour.

It was therefore determined by the Commonwealth Government that the excise duty on sugar and the bounty should be abolished on condition of the Queensland Parliament introducing satisfactory legislation to deal with the matter. Accordingly, Acts to repeal the excise duty on sugar and the *Sugar Bounty Act*, 1905 *to* 1912, were passed providing the abolition should commence on a day to be fixed by Proclamation. In July, the following year (1913) the Proclamation was issued, and the excise and bounty regulations which had governed the sugar industry since 1902 became a thing of the past.

The legislation introduced by the Queensland Parliament consisted of the following Acts:—

(1) "*The Sugar Growers Act of* 1913,"
(2) "*The Sugar Growers' Employees Act of* 1913,"
(3) "*The Sugar Cultivation Act of* 1913."

All these three Acts were to commence and take effect on and after the date of the commencement of the Act of the Parliament of the Commonwealth intituled the *Sugar Bounty Abolition Act* 1912.

"*The Sugar Growers' Act of* 1913" provided for the prompt payment to sugar-cane suppliers of a part of the value of the cane. Upon delivery to the owner of a sugar-mill of any sugar-cane agreed to be purchased, the owner should pay to him such part of the price of the sugar-cane supplied as was equal in amount to a sum at a rate per ton in accordance with the scale hereunder:—

Name of District.	Payment per Ton of Cane Supplied.
	s. d.
No. 1 District	9 8
No. 2 District	9 2
No. 3 District	8 8
No. 4 District	8 2

The boundaries of the districts were the same as in the Commonwealth Bounty Regulations, but the payments were 2s. 2d. in excess of the previous rates of bounty, the excess being equivalent to the £1 hitherto retained by the Commonwealth Government.

The Sugar Employees' Act made temporary provision with respect to the rates of wages and conditions of employment in the sugar industry until such matters were dealt with by Awards under "*The Industrial Peace Act of* 1912." The rates of wages payable and the conditions of employment were the same as laid down in the Commonwealth Act of 1912 prescribing same.

The third Act was for the purpose of prohibiting certain labour in the production of sugar. By this Act a certificate could be required from certain types of labour of having passed a dictation test in such language as the Secretary for Agriculture might direct. The object of this Act was to shut out certain coloured labour or aliens as might be required, or to prevent such persons from owning or cultivating land for sugar-growing—all this in furtherance of the growing of cane by white labour. The application of the Act did not apply of course to all native-born residents of Australia of European descent—all residents of Australia of European parentage—all residents of Australia descended from any resident of the Continent of North America (other than from any aboriginal native thereof or negro or aboriginal of African or Asiatic race), nor to other nations set out in the regulations, such as Italy, Russia, &c., where treaties existed.

The abolition of the excise and bounty regulations, as applied to sugar, relieved growers of a considerable burden in making returns and filling up statutory forms.

The so-called bounty was in reality only a rebate, and out of £4 per ton of sugar levied as excise the Federal Government returned only £3 to the grower, the other £1 being retained by the Federal Treasury, so that the Sugar Bounty Act passed by the Commonwealth Government as part of the White Australia policy did not cost the people a penny; indeed, it was estimated that it put £2,600,000 into the Commonwealth funds.

Within two or three years of the introduction of the above three Acts by the Queensland Government, many changes came about, due to the war. Industrial Courts came into being for the regulation of wages. Agreements were entered into as to the price of sugar between the State and Commonwealth due to the war, and Cane Prices Boards were established. The payments of different sums for different districts provided for in the Sugar Growers' Act ceased once cane began to be purchased on its commercial sugar value. These points will be dealt with more fully later. Meantime, having finished with the Commonwealth Acts for sugar excise and bounty, we may retrace our steps and get back to earlier in the century.

In 1902, perhaps the most severe drought in the history of the sugar industry was experienced. The following comparison of the rainfalls in the various sugar districts with the average, will show the intensity of the drought, especially in the more southern sugar areas:—

Place.	Rainfall, 1902.	Average Rainfall from first taking Records up to 1912.
Beenleigh	15·07	48·87
Nambour	14·94	60·93
Childers	17·62	42·07
Bundaberg	13·30	44·40
Mackay	36·51	68·52
Ayr	11·62	44.48
Ingham	37·31	80·53
Innisfail	69·87	149·20
Cairns	50·34	90·49
Port Douglas	37·82	82·91

In the Annual Report of the Sugar Experiment Stations for 1902 it was remarked that the intensity of the dry weather was most marked in the southern districts, the ground was stone hard and manuring was out of the question on crops that were being burnt up by the drought. The Logan district had only crushed 1,500 tons of cane compared with 21,000 in the previous year, while in the Childers and Bundaberg districts it was estimated that only some 75,000 tons of cane would go through the rollers in comparison with a crop of over 300,000 tons in 1901. At Mackay, things were better though there was a big drop there also, from 230,000 tons in 1901 to 150,000 tons in 1902. Further north, about Innisfail and Cairns, the crop was more nearly normal in production per acre. As a matter of fact the 1902 crop would come almost wholly from the areas including Mackay and further north. During the 1902 drought the cane crop in the south had been largely diverted to other uses than sugar production. Naturally, when things were so dry on the coast the western areas were far worse. Not only cane tops but hundreds of acres of cane were used for feeding purposes. The value given to the stunted crops as fodder had been a very material aid to cane producers, while on the other hand the cane crop had been an actual providence to stock holders. Sugar-cane, even in poorly developed condition, was looked on as an exceptionally valuable emergency crop in periods of drought and fodder famine, such as then existed. These factors caused the crops of 1902 and 1903 to be much smaller than in 1901 and 1904. The figures are as follows:—

Year.	Tons Cane per Acre.	Tons Sugar made.
1901	1,180,091	120.858
1902	641,927	76,626
1903	823.875	91,828
1904	1,326,989	147,688

Mackay and the far North produced 90½ per cent. of the crop in 1902. As much of the cane crop was killed right out, in 1902, it greatly affected the 1903 crop also. Fourteen of the sugar mills did not crush at all in 1902, and the larger mills in the South, such as Bingera and Fairymead had very small crops to crush.

In 1904, the fact that many of the Central Sugar Mills established under the 1893 Act were not paying their way called for investigation. Some of these mills had been put in the wrong places. Others did not receive a sufficient cane supply every year to render their operations payable, and management was not as efficient as it might have been. A report was called for on the condition of certain central mills, and upon the causes which led to their present unsatisfactory state, and for recommendations, the adoption of which might produce more practical results.

The mills reported on were Gin Gin, Mount Bauple, Nerang, Moreton, and Proserpine, specifically, and the remainder in general terms. In the report it was stated that neither "*The Sugar Works Guarantee Act of* 1893" nor the regulations under that Act contained any provision for enforcing the growing of "a sufficient quantity of cane for keeping the sugar works employed." The Act, in requiring "that sufficient land to keep such a sugar works so employed and of a quality to produce adequate crops of cane,'' omitted wholly to provide that central mills should be placed in localities only where an average of rainfall is assured by the records of previous years to co-operate with such land to produce cane crops. It was shown that the main effect on earning power of four of the five mills reported on was shortage of crop due to small rainfall.

The Act as it stood merely provided that the Treasury might hand over public moneys to a central mill to be engaged in the business of sugar-making under the control of the directorate selected from the members of the company, and without the co-operation, aid, or restraint of the Government which, to all intents, was a partner in the business, and was, moreover, solely responsible for the public capital that had become engaged in the business. The directors were generally men who had no knowledge of the business of sugar manufacture, nor experience in the control of large undertakings, and the shareholders comprised in the main cane farmers, men of small means whose experience had related to business on a domestic scale. It was due to the results of the provisions of the Act that such men assumed the direction of technical and commercial undertakings outside of their experience and competence.

The recommendations were that the central mills should be divided into three classes, as under:—

A. Central mills which had maintained their business in a sound condition and had met all obligations up to that date. There would be no ground for intervention in the affairs of mills of this class, and the Government should confine itself to affording any aid or advice which their directors might solicit.

B. Central mills whose business was not in a progressive or sound state and that were in arrears in their obligations. In the direction of the affairs of such mills the Government should co-operate and aid in the management and control of its business.

C. Central mills that have not met any portion of their obligations to the Treasury and whose present conditions are unsound and without assurance. Such mills should be taken over from the company by the Treasurer and their affairs controlled in the interests of the Treasury and others concerned.

As the outcome of these recommendations, a Bureau of Central Sugar Mills was established under the Treasury, whose Minister was the mortgagee and lawful representative of the State.

The mills that came under Class A were the Isis, Mulgrave, Mossman, Racecourse, Marian, Plane Creek, and North Eton Central Mills. Those in Class C which were taken over by the Treasurer as mortgagee, and the management of whose affairs was under the Comptroller of Central Mills, included Nerang, Moreton, Mount Bauple, Gin Gin, Pleystowe, and Proserpine Central Mills.

In the case of those mills which were to have come under Class B, the arrangement recommended was found impracticable owing to the opposition of the directorate to the advisory counsel of the Comptroller. The Treasurer therefore entered into possession of such sugar works, and they were included in Class C.

Subsequently, the Pleystowe Mill passed out of the possession of the Treasurer into the hands of the original Pleystowe Central Mill

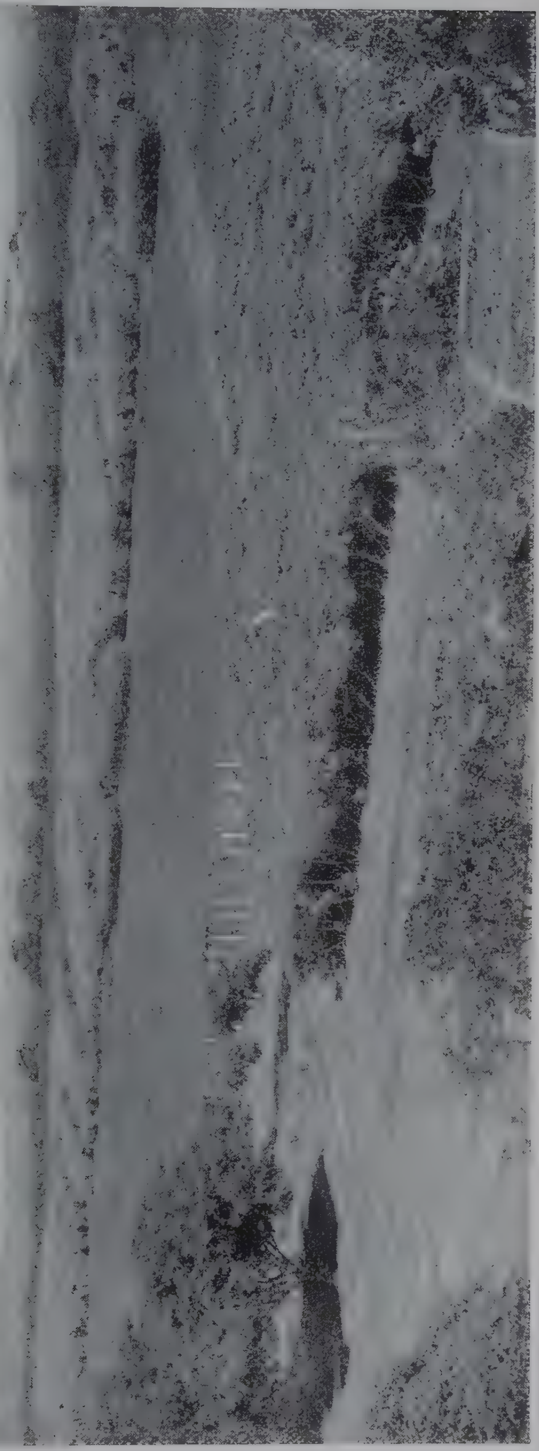

PLATE 75.—ON THE SUGAR EXPERIMENT STATION AT MACKAY, OLD SUGAR MILLS IN THE DISTANCE.

Company, Limited, in conjunction with the Queensland National Bank; that bank paid off all arrears of money and made itself responsible for all payments until the amount of the obligation of the mill to the Treasury had been liquidated. The transfer of the Moreton Central Mill from the Treasurer to the original company took place in January, 1907, they having paid to the Treasurer an amount in total liquidation of all capital moneys and interest due thereon. By June, 1907, the Racecourse Central Mill met its final payments, and its obligations to the Treasury were totally liquidated. This was the first of the central mills to redeem its obligations without outside assistance.

The next mills to pay off their indebtedness to the Government were the Marian at Mackay—which did so during the 1909-10 season—Plane Creek (Mackay), and Mulgrave (Cairns) in 1920-1921 season, Isis (Childers) in 1921-1922 season, and Mossman in the 1923-1924 season. Nerang Mill was closed in 1918, as it had been a losing concern for years. North Eton got into difficulties, and was taken over by the Government during the 1918-1919 season.

Of the original central mills there thus remained only Mount Bauple, Gin Gin, North Eton, and Proserpine, under Government control up till the year 1928.

The erection of the new central mills at Babinda, South Johnstone, and Tully will be dealt with in a later section, as well as the disposal of Mount Bauple, Gin Gin, and North Eton to Co-operative Sugar Milling Associations, by the Government.

[TO BE CONTINUED.]

Bureau of Sugar Experiment Stations.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS.

LOOK OUT FOR SIGNS OF WIREWORM INJURY.

The larvæ or so-called wireworm of certain of our elaterid and tenebrionid beetles, commonly known as "skip-jacks," &c., cause considerable damage at times to newly-planted cane setts by eating the eyes or young sprouting buds, or killing the older shoots by boring into same below ground level.

These pests are pale-yellow, shining, firm-bodied creatures, which slip easily from between one's fingers.

Some of the following methods of combating them will doubtless interest Queensland canegrowers, since they refer for the most part to cultural treatment of infested soil.

1. On heavy soils, the land should be very well worked, and not allowed to remain caked on the surface.

2. Attend to the drainage conditions if necessary; this being considered a very important point.

3. Plough deeply and at the same time collect as may of the wireworms as possible by hand before planting a crop.

4. Use organic manures; increase the humus content of the soil by means of green manuring, &c.

5. In severe cases of attack, fumigation of the soil may be necessary. This can be done with calcium cyanide or benzine after pre-baiting the land with suitable seed-traps.

In the event of this becoming necessary, the grower should communicate with the Entomologist at Meringa, who will supply full information on the subject.

6. Strew poison-baits along the bottom of furrows ploughed at regular distances; a good formula is:—Bran 25 lb., Paris green 1 lb., nitrobenzene one-eighth of an ounce. Other baits or trap-plants used are sliced-carrot, rice-bran roasted dry and moistened with water, and potatoes cut on one surface and set in the soil a few inches deep and about 10 feet apart; a piece of stiff wire piercing the tuber and showing above ground serves to indicate position of the bait.

SELECTION OF GOOD SEED.

When planting, reject all setts showing tunnels of the weevil borer. Do not purchase same, if possible, from a locality or plantation known to be borer-infested. Such seed often harbours young larvæ, which later on may eat so much of a sett as to make it useless for support of the young shoots, or perhaps result in their dying, thus causing unsightly misses. By means of such diseased setts this weevil borer often obtains a footing in clean canefields, and once becoming established is not easily got rid of.

In the Burdekin district great care must be taken in this connection to select seed free from tunnels of the white-ant or "Giant Termite" (*Mastotermes darwiniensis* Frogg.).

Should a grower wish to save seed of a valuable variety of cane chancing to show evidence of the presence of this borer, such setts should be immersed for half an hour before planting in water heated to a temperature of from 55 to 60 degrees Cent. When using top plants of Badila or other soft varieties, keep a look out for moth-borers, the presence of which is betrayed by tunnels opening on to the surface of the rind, blocked more or less by webbing or pellets of excreta.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following entomological report from Mr. E. Jarvis, Entomologist at Meringa, near Cairns:—

RELATION OF SUGAR ENTOMOLOGY TO BIRD LIFE.

In these enlightened days of scientific research, when entomologists are so fond of voicing the merits of biological control, we are, perhaps, inclined to dwell too much upon the entomological side of the question and not enough on the advantages to be derived from a closer study of our insectivorous birds and their habits.

Although the percentage of cane pests is probably small in comparison with that accounted for by parasitic and predaceous insect enemies—which attack not only the adults but also their eggs, larvæ, and pupæ—we should not forget that the services rendered by birds in helping to maintain what is known as the balance of nature cannot be too highly valued by the man on the land.

In the year 1914, when reporting on the sheep-maggot fly pest in Western Queensland, I noticed that the question of bird preservation was intimately associated with the trouble, and that, as a general rule, timbered country or scrub land affording shelter for bird life was free from or but slightly infested by sheep maggot flies—whilst on extensive areas devoid of trees the pest was generally at its worst. This was very noticeable both at Longreach and Emerald; those portions supporting timber being usually free from the fly, but the adjoining cleared open areas generally infested. (Queensland Agricultural Journal, Vol. I., pp. 174-181.)

Probably much of the land at present devoted to the cultivation of sugar-cane in Queensland (exceeding 224,000 acres) was originally more or less timbered country. After being cleared and planted, however, conditions very similar to those obtaining in the west with regard to bird life would naturally tend to become established throughout most of our cane land.

Deprived of suitable shelter and facilities for nesting, and forced, therefore, to retire from tracts of country on which they had been breeding in the past, the services of many of our useful insectivorous birds have been practically lost to us. To make matters worse, itinerant so-called sportsmen, continue to invade bird sanctuaries, and often for the mere lust of killing, blow to pieces every little songster they may chance to hear. Such crass ignorance is lamentable, and admittedly a crime against humanity at large, seeing that posterity is being robbed by us in this manner of certain beautiful species of the animal kingdom which once destroyed can never be replaced. Incredible as it may seem, one occasionally hears reports of the shooting of ibises and other grub-eating birds for food by some of our own canegrowers. Such foolish slaughter, if continued, must eventually lead to several of these feathered friends avoiding the neighbourhood of canefields and feeding elsewhere. Fifteen years ago it was a common sight to see flocks of the "straw-necked ibis" (*Carphibis spinicollis*) in cane lands around Gordonvale and Highleigh picking up grubs behind the plough; but now only one or two specimens are noticed at work in a field, and in some localities this valuable bird appears to have disappeared altogether.

Growers should take note that under Clause 8A of "*The Animals and Birds Acts*, 1921 *to* 1924," our birds are the property of the Crown, and that anyone found shooting animals or birds on areas proclaimed as sanctuaries, without a written authority from the Minister (Secretary for Agriculture and Stock) is liable to a fine of £20. In the event of an offender refusing to disclose his name or place of abode to an authorised officer, ranger, or any member of the police force, or to give up his gun or other weapon together with the birds or animals killed by him, runs the risk of being fined £5, or if offering resistance, a fine of £50. Moreover, landholders are not allowed to trap birds or animals on their own selections without a permit, which, however, does not entitle them to carry on such occupation on any other selections.

The areas proclaimed as bird sanctuaries which chiefly concern the Cairns areas are:—The Shires of Cairns and Barron, the Bellenden Ker Reserve, Kuranda (Mona Mona Mission) and Lake Barrine Reserve.

Amongst the list of 123 birds which are protected during the whole of the year throughout Queensland, the following are often found in our canefields, where they render more or less important services. The larger birds (1 to 9) devour great numbers of greyback cockchafers and their grubs, and probably many weevil borers and grasshoppers; while the smaller species doubtless account for their full share of leaf-eating caterpillars, small beetles, leaf-hoppers, &c., and by helping to thin the ranks of such prolific insects prevent them from becoming serious cane pests.

1. Straw-necked Ibis	*Carphibis spinicollis*
2. White Ibis	*Ibis molucca*
3. Pewee or Mud Lark	*Grallina picata.*
4. Indian Myna	*Acridotheres tristis.*
5. Brown Hawk	*Hieracidea berigora.*
6. Leather Head	*Tropidorhynchus buceroides.*
7. Laughing Jackass	*Dacelo leachii.*
8. Fig Bird	*Specotheres flaviventris.*
9. Blue Jay	*Graucalus melanops.*
10. Australian Bee-eater	*Merops ornata.*
11. Black and White Fantail	*Rhipidura motacilloides.*
12. Black-faced Cuckoo Shrike	*Coracina robusta.*
13. Pallid Cuckoo	*Cuculus inornatus.*
14. Leaden Flycatcher	*Myiagra rubecula.*
15. Rufous-breasted Whistler	*Pachycephala rufiventris.*

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following notes on the construction of machinery for fumigating scarabæid grubs, together with a brief report of experimental work against cane insects, for the period April to May, 1930, from the Entomologist at Meringa, Mr. E. Jarvis:—

FUMIGATING APPLIANCES.

Some Essential Points in the Construction of Machines for Fumigating Cane-Grubs

During the present season considerable interest has been taken by some of our cane farmers in the trial of various appliances for fumigating the soil of grub-infested cane land. As a result of such field demonstrations, two pre-eminently important facts have become evident. Firstly, that a machine of this kind should not be too heavy to handle conveniently, or steer in such manner as to easily maintain a uniform distance from the line of cane being treated, despite occasional irregularities due to faulty planting or to differences in growth of individual stools. In order to obtain these desirable features it should, therefore, in the second place, be designed to inject only one side of a row of cane, instead of two sides.

In machines intended for applying liquid injections, provision must be made for regulating the depth of same, so that a fumigant can be buried uniformly at distances varying from 2 to 5 inches below the surface. The roller which is used for levelling and slightly pressing the disturbed soil lying immediately above lines of injection is also an essential provision, and tends to ensure a uniform depth of application. This must not be too heavy, from 10 to 15 lb. weight being sufficient, and should not exceed about 8 inches in width. The main wheel that drives the mechanism for dropping the fumigant should have a diameter of about 18 inches, with flat tyre 2 to 3 inches wide, provided with short iron pegs to ensure getting a good grip on cultivated land. The position of this wheel and dropper must be so arranged as to enable the operator, if desired, to inject a line of the insecticide used about 4 inches from the nearest cane shoots. This can be accomplished by putting them to one side of the machine (the right hand preferably) instead of centrally. At the same time one should bear in mind that, while drilling close alongside the rows, the horse might be forced to walk a little out of the centre, so that damage to the stools from blows of the swingle-bar would need to be overcome.

A Promising Machine.

A machine for burying dry fumigants such as calcium cyanide, nodules of paradichlor., &c., lately constructed by Messrs. Wyper Brothers, of Bundaberg, working in co-operation with the Entomologist at the Southern Sugar Experiment Station, has been tested here this season under field conditions, and given good results. This appliance, which weighs about 1½ cwt. and is designed for treating one side of the row, is easily manipulated with one horse, and, after a few minor improvements have been made, should prove serviceable next season for fumigating plant cane from 3 to 4 feet high.

Horse-drawn machines for treating grub-infested second and third ratoons have yet to be invented, and are likely to prove a difficult problem. In the case of ratoon crops one is called to deal with stools which may vary from 1 to 2 feet or more in width, while, owing to the irregular growth of side shoots and matted surface roots, it is not easy to draw a straight furrow closer than 6 to 8 inches from the nearest shoots. Such fumigation could not be expected, of course, to destroy grubs which might be feeding near the centre of big stools a foot or more away from points of injection.

The maximum success of any machine for fumigating infested soil in which the grubs present are lying at a uniform depth from the surface is not likely to be achieved on indifferently cultivated land. As pointed out in my Monthly Hints for this month (May) (see "Queensland Agricultural Journal" and "Australian Sugar Journal") it should be the aim of every grower to gradually bring the first few inches of his top soil into an even friable state by means of frequent cultivation; seeing that the establishment of such level and mechanical conditions of soil porosity tend to ensure the fumigant being administered uniformly, as regards depth, quantity, distance from the plants, and between individual doses.

Experiments Against Grubs With Ortho-Dichlorobenzene.

The samples of commercial liquid Di-chlor Benzol, and soluble Dichlorbenzol received from Sydney last November, and forwarded to this Experiment Station for trial against cane grubs, have lately been tested in our laboratory and under field conditions.

Although deadly to grubs confined in cages of moist soil—a mortality of 100 per cent. occurring within three days—ortho-dichlor. when injected in doses of 7 cc. within 3 inches of the stools caused wilting, and in many cases ultimate death of the cane. The Assistant Entomologist, Mr. Buzacott, who carried out these experiments, believes this form of dichlorobenzene to be extremely poisonous to plant life.

Results obtained later under field conditions showed that when mixed with carbon bisulphide and injected 6 inches from cane plants slight wilting took place and living grubs were afterwards found under stools so treated.

Additional experiments, however, with this fumigant will be made later with a view to discovery of some way of making it less harmful to plant life.

Spraying Experiments Against Aphides and Scale Insects.

The plant louse of sugar-cane (*Aphis sacchari* Zehn.) has been fairly plentiful this season, having occurred at Aloomba and elsewhere in sufficient numbers to attract attention from our growers. Although of minor economic interest this pest appears to have increased during the last few years rather than diminished, and on several occasions has been found attacking the young heart-leaves of cane. When confined to the older mature foliage the damage inflicted by these plant lice is practically negligible, but in the event of severe infestation there is always a danger of the winged forms and viviparous females ultimately finding their way to the upper portions of affected stools.

This insect invariably frequents the under surface of the leaves, which, acting like a roof, afford ample protection from extremes of heat or wet weather. Owing to this habit its presence on a plantation usually remains unnoticed until betrayed by blackening of the foliage, due to the growth of a fungus called Fumagine, which grows thickly upon a sweet fluid secreted by the aphides, and which is scattered freely over the surface of an affected leaf.

Upon the first appearance of such aphis attack the lower leaves of the surrounding cane should be carefully examined, and those found to be badly infested stripped off, remove from the affected block, and laid together in a heap to be burnt.

In the event of the heart-leaves being badly attacked the aphides must be destroyed by spraying. Recent experimentation carried out at Meringa laboratory has resulted in the elaboration of the following solution, which we have found to be both cheap and effective against soft-bodied insects:—Soap, 1 lb.; crude carbolic acid, ½ lb.; water, 4 quarts.

To prepare this spray, cut up the soap, boil in the water until dissolved, stir the carbolic slowly into it, boil together for about twenty-five minutes, and strain.

This makes the stock-solution, to each part of which, before using, add nineteen parts of water. It will be found a good plan to heat the solution before spraying, to about 40 deg. Cent.

Crude carbolic acid can be obtained from the Australian Chemical Company, Donkin street, South Brisbane, at 1s. 6d. a tin, of one quart. White bar-soap ("Witch" brand) was found one of the best to use for such purpose.

A simple form of Knapsack spray-pump will be found quite suitable for this work. Use a nozzle which will forcibly deliver a mist-like spray capable of thoroughly wetting and clogging up the masses of aphides.

The more difficult problem of mealy-bug control will be dealt with in my next report.

CANE PESTS AND DISEASES.

The Pathologist to the Bureau of Sugar Experiment Stations has contributed the following notes on Sugar Cane Quarantine Districts recently declared in Queensland.

The majority of Queensland canegrowers are no doubt aware of the fact that there are a number of the more serious diseases of sugar-cane which are not generally distributed throughout the State. That is to say, any one of these diseases may be present in one district and not in others. It naturally follows, therefore, that it is a very unwise practice to take cane from certain districts for the purpose of planting in other districts. For example, owing to the presence of Fiji and gumming diseases, it would be very dangerous to take cane plants from Bundaberg to the Burdekin, where these diseases do not exist.

In order to prevent haphazard interchange of sugar-cane varieties between districts, a special proclamation has been issued under the new Diseases in Plants Act of 1929. Under the terms of this proclamation the Queensland sugar belt has been divided into nine quarantine districts, and the removal or introduction of sugar-cane plants from or into any of these districts is prohibited unless a permit in writing has been issued by an inspector under the Diseases in Plants Act.

The boundaries of the quarantine districts so proclaimed are set out hereunder:—

1. Far Northern.—The area lying north of a line drawn due west through Cardwell.
2. Herbert.—The area lying between a line drawn due west through Cardwell on the north, and a line drawn due west through Townsville on the south.
3. Lower Burdekin.—The area lying between a line drawn due west through Townsville on the north, and a line drawn due west through Bowen on the south.
4. Proserpine and Mackay.—The area between a line drawn due west through Bowen on the north, and Alligator Creek on the south.
5. Plane Creek.—The area lying between Alligator Creek on the north, and a line drawn due east and west through Rockhampton on the south.

6. Bundaberg-Childers.—The area lying between a line drawn due east and west through Rockhampton on the north, and a line following the Burrum River to its junction with the North Coast Railway, near Howard, and thence due west, on the south.
7. Maryborough.—The area between the southern boundary of the Bundaberg-Childers district on the north, and a line drawn due west through Hook Point (on the southernmost end of Great Sandy Island) on the south.
8. Moreton.—The area lying between the southern boundary of the Maryborough district on the north, and a line drawn due east and west through Brisbane on the south.
9. Logan.—The area lying between a line drawn due east and west through Brisbane on the north, and the boundary of the State of New South Wales on the south.

It should be noted that in the event of unpermitted removal of cane plants from one district to another both the person forwarding the cane plants and the person receiving them are guilty of an offence under the Act, and are liable to prosecution.

Any grower desiring to remove sugar-cane plants from one district to another should apply to the Pathologist, Bureau of Sugar Experiment Stations, Brisbane, for the necessary permit, giving reasonable notice in order to permit of an inspection being carried out.

The existing proclamation which prohibited the sale of cane plants within the counties of Ward, Stanley, Canning, and March has been rescinded. No permits will now be required for the transfer of cane plants to farmers within these counties, but a permit will be required if it is intended to send the plants out of the particular quarantine district.

Mr. R. W. Mungomery, Assistant Entomologist, Bundaberg, has submitted the following report (22nd April, 1930) to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

Many varied opinions exist regarding the effects which the wet season rains have on the ordinary white grub, or cane grub as it is more commonly known in these parts, and some growers have opinions of an exaggerated nature concerning the benefits to be derived from the cyclonic rains and floods and the relationship of these latter towards the control of certain insect pests.

It is true that submergence in water has been a means of destroying many root-feeding insects, and the grape vine phylloxera is a notable example of a major insect pest being controlled in a large way by the periodical flooding of vineyards in parts of France. Again, artificial inundations have been in vogue for many years in Hungary for destroying white grubs and other insect pests in meadows, but, although the usual period of such flooding is about eight days, other investigators have shown that white grubs may remain in such flooded areas where the ground is impermeable for over a month without being destroyed.

For control to be efficient it is essential that the land should be almost level and of such a nature that, although not impermeable, water should not penetrate it easily, both of which essential conditions are not readily obtainable in our grub-infested fields. Usually land which is infested with grubs is a good friable natured soil, either red volcanic or sandy loam, and varying in contour from gentle slopes to hilly country. As a matter of fact, cane grubs are rarely found in level wet clayey situations such as would permit of easy flooding, and they certainly are not present in sufficient numbers to cause apperciable damage to cane.

To test the effect of submerging cane grubs in water, several normal healthy third-stage grubs were subjected to this treatment. When first submerged they gave several convulsive movements, and after an interval of about two minutes their movements gradually diminished until all action ceased after three minutes' immersion. To any one unaccustomed to their habits it would have appeared as if these grubs were dead, but this was not the case, as they remained in this state of suspended animation throughout the course of the experiment, and, as explained later, many of these eventually recovered.

At the expiration of one and two days respectively a number of these grubs were removed from the water and placed on moist soil, and it was surprising to note how quickly some of these recovered and commenced to dig normally into the soil. Others that were removed after three and four days immersion did not recover so quickly, and in some cases deaths occurred, but nevertheless a fairly high percentage recovered from this treatment. After five days' immersion only a small percentage recovered, and it is considered that not many survive much greater periods than this. Seldom, however, do grub-infested fields remain under water for very long periods, and during the three weeks' continuous rainy weather in the early part of this year (January and February) some grub-infested blocks of cane were under observation, and in no case could dead grubs be found in water-logged soil that was not actually flooded.

When heavy rain falls grubs may respond in either of two ways, according to their position in the soil and the time of the year. In the one case they may retreat to a fairly clayey subsoil and enclose themselves in an impenetrable clayey cell, and in this position they are fairly secure. On the other hand, in the warmer months of the year, what usually does happen is that they approach closer to the surface of the ground, and though torrential rains may cause temporary inactivity on their part they soon become active again when a lull occurs in the rainfall. In a few cases rushing torernts may wash these pests out of the cultivation and carry them along the drains and on to the sides of the roads, where they are eaten by birds, but the percentage of control due to this factor is comparatively small. Wet weather may indirectly affect grubs by promoting a spread of fungous and bacterial diseases which are capable of causing their destruction. However, it is not so much in the death of the grubs themselves as in the general stimulating effect on the growth of the cane plant, where the main benefit of the rainy season is to be noticed.

In dry weather the plant has difficulty in maintaining its usual rate of growth, and when destruction of the roots by grub attack is added to this, a further handicap takes place. In the rainy season root development proceeds at a rapid rate of growth, and consequently the plant shows renewed vigour, all of this happening at a time when the grubs are full fed or fast approaching that condition, with the result that the grubs no longer harass the roots to any great extent and the growth of the cane plant is maintained. This recovery on the part of the plant should not therefore be attributed to the wet weather killing the grubs, but to the variety of favourable conditions operating at that particular time.

It will be apparent from this that it is futile to enjoy a false sense of security and imagine that the wet season is going to be the panacea of all cane grub worries. To allow grubs to remain undisturbed is only another means of heaping up trouble for future years. Grub-infested cane should be treated when grubs show their first signs of attack, and a clean-up campaign should be instituted, either by ploughing out the affected field and hand-picking the grubs or by fumigating the yellowing stools.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report for the month ended 12*th April*, 1930, *from the Assistant Entomologist, Mr. A. N. Burns, Mackay:—*

Review of the Past Greyback Beetle Flight.

Contrary to the expectations anticipated from the long and continued dry season of 1929, the flight of greyback beetles was reported as being unusually large, and in the Mackay district just on 24 tons of beetles were collected and destroyed at the various mills, &c.

It is usual after a prolonged dry spell to note that many beetles perish in the soil owing to being unable to escape from their pupal cells; a natural check is thus effected and the resulting flight lessened in point of number. It is therefore quite probable that the 1929-30 flight would have been even greater if the rains had fallen a month earlier than they did—i.e., at the end of November instead of the end of December.

Collecting of beetles appeared to be much more enthusiastically and systematically carried out this season than in the past; this would probably have a slight tendency towards over comparison of the magnitude of the flight as compared with previous ones.

In view of this heavy flight, many growers will naturally think that there is soon to be heavy grub infestation, and that it should be unusually severe because there was a large flight of beetles; this does not necessarily or invariably follow. It is a recognised fact that a scarcity of any particular insect is frequently followed the next season or generation by a great abundance of it, and vice versa. Insect and fungoid parasites are doubly responsible, which in reality is only the restoration of natural balance.

Greyback Grubs (*Lepidoderma albohirtum* Waterh.) near Sarina.

Early this month a visit was paid to some of the cane areas between Dawlish and West Plane Creek, and in one instance at the former place greyback grubs were observed feeding at cane roots. Damage was only commencing, and no indications had manifested themselves in the leaves of the cane. As many as five grubs were located at some stools; these were mostly still in the second stage, and a few newly changed third-stage grubs were also noted. Whilst in the first and second stages little actual root injury is done by grubs; they subsist chiefly on humus, &c., obtained by the continual ingestion of soil. Once the third stage is reached their diet becomes almost wholly vegetable, and it is in this stage, which usually occupies about four months, that the damage to cane is done.

By the end of the present month (April) the grubs will have all reached the third stage, and growers who are usually troubled with grubs will be well advised to dig alongside a few stools in areas usually subjected to attack to see if grubs are present or not. If they are found to be present in any numbers, fumigation should be immediately undertaken. If this is done before the root systems of the cane stools are almost totally destroyed, the chances of quick recovery are much better. It is therefore clearly advisable to try and ascertain if grubs are active at cane roots before waiting until such time as the cane commences to wilt or, in extreme cases, to topple over.

Greyback Grubs (*Lepidoderma albohirtum* Waterh.) at Mia Mia.

Parts of the Mia Mia district were very severely attacked by Greyback grubs in the autumn of 1929, so it was decided to visit the same areas again this month in order to see whether the damage here this season would be likely to approach the same extent as that of last season. One block which carried Badila last season, and which was very severely attacked, was carefully examined. This field has since been replanted with Clark's Seedling principally, and examinations made alongside stools show that it will possibly be free from attack this season. At one stool only of those examined were any grubs located, and then only one.

In a patch of Q. 813 growing across a roadway grubs were plentiful, and a few stools were beginning to show yellowing in the leaves, and were commencing to lose anchorage with the soil. Q. 813 is a very poor grub-resisting cane owing to its shallow rooting system. Three Greyback grubs are quite sufficient to eat out one stool of this variety. This particular block of cane was badly attacked last year.

Taking the area inspected as a whole, it appears from present indications that it will not suffer from grub damage to anything like the extent that it did in the 1929 autumn. It is reported that the beetles were very plentiful this summer, and that large numbers were collected in the Mia Mia district. Fig trees, as is usual, were mentioned as being the most favoured feeding trees.

Notes on Fumigation with Carbon Bisulphide.

When the presence of grubs is discovered at cane stools, a careful note should be made of the depth at which they are feeding. The reason for this is that the poison should be injected to a depth slightly less than that at which the grubs are situated, because the fumes of carbon bisulphide are heavier than air, and therefore tend to penetrate downwards. The footplate of the injector can be adjusted to suit this.

It is advisable, if possible, to have the spaces between the cane rows as free from grass and weeds as possible, because the roots of these are also attractive to grubs, which after fumigation, when the poison has dispersed, may ultimately migrate to the cane roots and cause another minor infestation. Ordinarily clean cane is all that is necessary—the above only applies to cane that is very dirty and where the inter-rows are choked with weeds. Do not fumigate immediately after heavy rains, because when the soil is water-logged the poison fumes are unable to permeate the soil particles and root system. Damp or very moist soil is all right to fumigate. It is usual to allow at least two days, preferably three, to elapse after a heavy downpour before attempting fumigation. Doses of fumigant may either be injected at both sides of the stools or else in the centres of the plants. The chief advantage in the latter method lies in a saving of time in that it is necessary only to traverse each row once, whereas by placing doses on either side of the stools each row has to be gone along twice. With side plant fumigation the doses are directed towards the cane roots, and the spear of the injector is injected about 2 in. or so (not further) away from the plant. On the other hand, with central stool injection, the dose aperture is directed towards the outside of the row, one dose is given, then the aperture is turned round without withdrawing the injector and facing the opposite side. and another dose is given. It is wise to always fill in the spear-hole by pressing the earth with the foot after doing a stool. Fumigant and injectors may be procured by application to the Secretary Mackay Pest Destruction Board, Shire Offices, Wood street, Mackay.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (16*th May,* 1930) *from the Assistant Entomologist, Mr. R. W. Mungomery, Bundaberg:—*

SOOTY FUNGUS ON SUGAR-CANE.

Inquiries frequently come to hand regarding the appearance of a dirty blackish discolouration of the older cane leaves at this time of the year. Some growers view this with more concern than is necessary, thinking their cane to be smitten by some new disease which will suddenly wipe out their crops; and what appears to add weight to their ideas on this matter is the fact that often only certain varieties are affected, which would give one the impression that this was the commencement of a serious disease.

Actually, this is only a minor trouble, caused as a result of aphids feeding on the cane leaves. Colonies of these very small insects, or plant lice as they are sometimes called, are most commonly found on the underneath side of the older cane leaves, where they are attended by ants. A very intimate association exists between aphids and ants, some colonies of aphids being unable to thrive unless ants are present to look after them. Ants frequently find suitable food plants for the aphids, and when these are overcrowded, the young aphids are transferred to other plants or to other portions of the same plant which are not so thickly populated; in addition, they also afford them a certain amount of protection from their enemies. In return for this attention, the aphids secrete a kind of honey dew, which is eagerly sought after by the ants, and from this peculiar relationship, aphids have sometimes been referred to as ''ants' cows.''

In the case of sugar-cane aphids, some of the honey dew secreted by them falls on the surface of the leaves immediately beneath where the colonies are feeding, and this gives the cane leaves a shining, sticky appearance. Later on, a fungus commences to grow on this honey dew, and gradually extends over the whole surface on which the honey dew has fallen. The fungus is blackish in colour, and this produces the dirty, sooty discolouration previously referred to as appearing on the leaves. Living as it does on the secretions from the aphids and not on the plant tissue, the fungus has little effect on the growth of the cane plant, and the only injury it does is to block up some of the breathing pores of the older leaves.

Aphids have a short life cycle, and during their adult stage produce a large number of young. They therefore are very prolific and this accounts for their sudden appearance in large numbers in places where formerly there were no signs of them. The number of natural enemies with which they have to contend is large, ladybirds and their larvæ, certain fly larvæ, and others, all exacting toll from their colonies. Weather conditions also have a big controlling effect, and a sudden increase in the aphid population is soon brought about under control by these several agencies. Therefore, artificial control measures are unnecessary.

From this it will be apparent that this sooty fungus is only a temporary visitation, and once the aphids disappear and the older leaves fall off, the cane soon assumes its former green appearance.

Readers are reminded that a cross in the prescribed square on the first page of this " Journal " is an indication that their Subscription —one shilling—for the current year is now due. The " Journal " is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

FLAG SMUT IN WHEAT EXPERIMENTS, 1929.

By R. B. MORWOOD, M.Sc., Assistant Plant Pathologist.

After the outbreak of Flag Smut in 1928 it was deemed advisable to conduct a test of the susceptibility of the varieties of wheat commonly grown in Queensland, and also of the effect of the usual seed treatments in preventing the spread of the disease. The experiments were designed by the Plant Pathologist (Mr. J. H. Simmonds) and the necessary arrangements for carrying them out were made by the Director of Agriculture (Mr. H. C. Quodling). In the field work the writer had the able co-operation of Messrs. C. S. Clydesdale (Instructor in Agriculture), S. M. Smith, and H. Lewis at Allora. At Roma, the experimental plots were located at the State Farm where the Manager (Mr. R. E. Soutter), assisted by Mr. Ball (Assistant Experimentalist), and the farm hands co-operated with the writer. Thanks are due to Messrs. Geitz Brothers, on whose property the experiments were conducted at Allora.

Thirty-one named varieties of wheat and nine Departmental crosses were tested for susceptibility to flag smut. Canberra, which was known to be susceptible, was taken as a standard of comparison. Eight seed treatments were tested. Experiments were conducted in two localities (Roma and Allora), and in the case of the susceptibility trials an early and a late planting was made in each locality.

Experiment I.—Susceptibility Trials.

In this experiment the seed of each variety was shaken with spores of flag smut (*Urocystis tritici*). The spore material consisted of heavily infected wheat which was dried and then fragmented in a mincing machine. Approximately 1 gram of the resulting mixture of spores and chaff was shaken with 20 grams of wheat. One row of each variety was planted in each planting at each locality. The rows were made 2 chains long and spaced 2 feet apart, with the grains planted about 6 inches apart in the rows. At the beginning, and again after every fourth row, there were placed a row of Canberra wheat free from spores and one infected in the same manner as the rest of the varieties. The dates of planting were:—

Allora (first planting)	9th May
Roma (first planting)	11th May
Roma (second planting)	11th June
Allora (second planting)	4th July

At Allora at the time of making the first planting there was good subsoil moisture, but the cultivated surface layer was somewhat dry. It proved too dry for germination, and only an odd plant came up till showers one month later brought the majority through. As a result the number of plants per row was very irregular, extremes being 15 and 155. This averages about a 50 per cent. germination. The plants subsequently developed into large stools in spite of dry conditions during August and September.

The second plant, at Allora, was made following good rains early in July and germinated immediately, growing into very uniform rows.

The first planting at Roma was made under conditions somewhat similar to those at Allora, but in a rather lighter soil. A fair germination was the result. The wheat grew well to maturity in spite of getting less than 1 inch of rain from sowing till ripening.

The second planting, at Roma, was made after 40 points of rain. Soil moisture was good and an excellent germination resulted. These plants made sufficient growth for the purposes of the experiment, but were eventually somewhat stunted by the dry conditions.

The first smutted plants were observed by Mr. Soutter at the beginning of August in the plot at Roma planted 11th May, 1929. The plants were examined at intervals, and all found affected with flag smut were removed and burned after carefully recording the number per row. The symptoms varied from a few dark lines on the leaves of one small tiller, the rest of the plant being normal, to a condition of severe infection in which, in addition to the presence of the characteristic symptoms, the whole plant was reduced to a grass-like habit. The infections showing up for the first time in the later observations were mostly light, usually only one tiller being affected. The final count was made in all sections after the early-maturing varieties were ripe.

Only one smutted plant was found in the rows of Canberra free This one was explained by the breeze blowing spores from an earlier planted adjacent infected row. The freedom of the remainder demonstrated the freedom of the soil and of the sample of Canberra seed used from flag smut.

The infection per 100 plants for each row of Canberra infected is given in Table I.

TABLE I.

Row No.	Variety.	PERCENTAGE INFECTIONS.			
		ROMA.		ALLORA.	
		Early Planting.	Late Planting.	Early Planting.	Late Planting.
1B ..	Canberra infected ..	25·9	69·6	8·6	5·6
4B ..	Ditto	45·0	46·2	10·1	3·3
8B ..	Ditto	34·7	50·6	7·6	8·5
12B ..	Ditto	33·5	52·8	8·6	2·8
16B ..	Ditto	34·9	47·0	6·1	7·4
20B ..	Ditto	10·1	49·8	6·3	6·3
24B ..	Ditto	20·7	57·8	11·8	9·4
28B ..	Ditto	35·5	46·2	5·3	5·1
32B ..	Ditto	14·7	37·2	9·7	4·6
36B ..	Ditto	15·4	54·4	10·9	5·3
40B ..	Ditto	37·6	68·0	8·0	3·5
	Mean	28·0	52·7	8·4	5·6
	P.E.	± 2·31	± 1·95	± 0·42	± 0·43

Table II. shows the percentage infection of each row and also the amount of infection compared with the average of the rows of Canberra in the planting. The former figures varied with time and place of planting, so had to be expressed in a common standard. For this purpose the average percentage infection per row of Canberra for the first planting at Roma was called 100, and the percentage infection of the other rows in this planting raised proportionately. The other plantings were then dealt with in the same manner. By this means there were obtained figures for the infection of each variety relative to the known susceptible variety.

TABLE II.—SUSCEPTIBILITY TRIALS.

Row No.	Variety.	Per Cent. Infection. Roma. Early Planting.	Per Cent. Infection. Roma. Late Planting.	Per Cent. Infection. Allora. Early Planting.	Per Cent. Infection. Allora. Late Planting.	Relative Infection on Scale Canberra = 100. Roma. Early Planting.	Relative Infection on Scale Canberra = 100. Roma. Late Planting.	Relative Infection on Scale Canberra = 100. Allora. Early Planting.	Relative Infection on Scale Canberra = 100. Allora. Late Planting.	Average.	P.E.
1A	Canberra free	0	0	0	1·0						
1B	Canberra infected	25·9	69·6	8·6	5·6						
1	Pinto	20·8	13·1	3·0	0·4	74·7	24·8	35·7	7·1	35·6	± 10·04
2	Cedric	53·6	40·4	20·0	3·4	193·0	76·8	237·0	60·6	141·8	± 29·20
3	Warren	10·5	15·0	1·0	0	37·5	28·5	11·9	0	19·5	± 5·65
4	Warrior	34·9	12·6	1·2	0	124·0	23·9	14·3	0	40·5	± 19·04
4A	Canberra free	0	0	0	0						
4B	Canberra infected	45·0	46·2	10·1	3·3						
5	Merridan	26·6	52·2	5·5	1·1	95·2	99·2	65·5	19·6	69·9	± 12·63
6	Novo	17·1	3·6	2·5	1·9	61·0	6·8	29·8	34·0	32·9	± 7·48
7	Beewar	10·8	49·4	1·0	0·6	38·6	93·6	11·9	10·7	38·7	± 13·08
8	Caliph	25·2	9·5	1·4	0	90·0	18·0	16·7	0	31·2	± 13·51
8A	Canberra free	0	0	0	0						
8B	Canberra infected	34·7	50·6	7·6	8·5						
9	Currawa	4·4	3·9	4·1	0	15·7	7·4	48·8	0	18·0	± 7·26
10	Florida	56·4	37·8	4·8	1·5	201·0	72·0	57·2	26·8	89·2	± 25·83
11	Watchman	30·6	67·5	15·4	5·1	128·0	128·0	188·0	91·3	133·8	± 13·52
12	Barwang	10·2	20·0	10·7	1·0	36·4	32·3	127·0	17·9	53·4	± 16·84
12A	Canberra free	0	0	0	0						
12B	Canberra infected	33·5	52·8	8·6	2·8						
13	Flora	60·5	52·0	14·3	4·5	216·0	98·8	170·0	80·5	141·3	± 21·20
14	Amby	5·4	25·0	1·7	0·6	19·3	47·5	20·3	10·7	24·4	± 5·37
15	Booraloo	15·7	35·3	5·5	1·5	56·0	67·0	65·6	26·8	53·8	± 6·30
16	Waterman	6·3	0	0	0	22·5	0	0	0	5·6	± 3·79
16A	Canberra free	0	0	0	0						
16B	Canberra infected	34·9	47·0	6·1	7·4						
17	Roma Red	6·5	2·9	1·0	0	23·2	5·5	11·9	0	10·1	± 3·36
18	Gluyas	14·3	11·2	6·2	3·7	51·0	21·3	74·0	66·2	53·1	± 7·86
19	Warchief	4·1	0·3	0	0	14·7	0·6	0	0	3·8	± 2·45
20	Three Seas	32·6	32·3	1·2	1·4	116·0	61·2	14·3	25·0	54·1	± 7·01
20A	Canberra free	0	0	0	0						

TABLE II.—*continued.*

Row No.	Variety.	Per Cent. Infection. Roma. Early Planting.	Per Cent. Infection. Roma. Late Planting.	Per Cent. Infection. Allora. Early Planting.	Per Cent. Infection. Allora. Late Planting.	Relative Infection on Scale Canberra = 100. Roma. Early Planting.	Relative Infection. Roma. Late Planting.	Relative Infection. Allora. Early Planting.	Relative Infection. Allora. Late Planting.	Average.	P.E.
20B	Canberra infected	10·1	49·8	6·3	6·3						
21	Clarendon	23·2	7·5	4·1	0	82·9	14·3	48·8	0	36·5	± 12·51
22	Bunge No. 1	12·8	2·1	1·0	0	45·7	4·0	11·9	0	15·4	± 7·01
23	Budd's Early	17·4	36·5	12·6	1·9	62·2	69·5	150·0	34·0	76·4	± 18·80
24	Florence	1·6	3·9	0	0	5·7	7·4	0	0	3·3	± 1·30
24A	Canberra free	0	0	0	0						
24B	Canberra infected	20·7	57·8	11·8	9·4						
25	Pusa	12·0	5·4	3·1	0	42·8	10·3	36·8	0	22·5	± 6·94
26	B.I.P.M. 2610	1·2	0·4	0	0	4·3	0·8	0	0	1·3	± 0·69
27	B.I.P.M. 2612	0	0·5	0	0	0	1·0	0	0	0·25	± 0·17
28	B.I.P.M. 2615	1·3	0	0	0	4·6	0	0	0	1·1	± 0·78
28A	Canberra free	0	0	0	0						
28B	Canberra infected	35·5	46·2	5·3	5·1						
29	Gem	21·8	25·4	10·0	0	78·0	48·3	119·0	0	61·3	± 16·90
30	Patriot	33·5	27·5	4·1	1·5	125·0	51·7	48·7	26·8	63·0	± 14·53
31	Cleveland	58·9	79·8	5·5	0·9	209·0	151·0	65·6	16·1	110·4	± 29·19
32	Piastre	67·2	77·6	9·5	4·6	240·0	147·0	113·0	82·0	145·5	± 23·02
32A	Canberra free	0	0	0	0						
32B	Canberra infected	14·7	37·2	9·7	4·6						
33	Duke of York	22·6	27·2	5·4	1·8	80·8	51·6	64·3	33·2	57·5	± 6·78
34	B.F.G. 2613	43·5	40·2	5·4	1·7	159·0	76·4	64·3	30·4	82·5	± 18·41
35	B.I.P.M. 2604	1·3	0	0	0	4·6	0	0	0	1·1	± 0·78
36	B.I.P.M. 2608	7·9	6·3	0	0	28·2	12·0	0	0	10·0	± 4·50
36A	Canberra free	0	0	0	0						
36B	Canberra infected	15·4	54·4	10·9	5·3						
37	B.I.P.M. 2609	5·5	5·9	2·9	0	19·7	11·2	34·5	0	16·3	± 4·90
38	Nabawa	1·5	1·2	0	0	5·4	2·3	0	0	1·9	± 0·86
39	Coronation	29·8	47·3	11·9	3·0	106·0	89·8	141·0	53·6	97·6	± 12·41
40	Pilot	18·3	20·7	2·6	0	65·4	39·4	31·0	0	33·9	± 9·09
40A	Canberra free	0	0	0	0						
40B	Canberra infected	37·6	68·0	8·0	3·5						

The only varieties which were definitely proved to be less than one-twentieth as susceptible as Canberra were the Departmental crosses B.I.P.M. 2612, 2604, 2615, and 2610. There were no significant differences between these crosses, though there were strong indications that they were more resistant than B.I.P.M. 2608 and 2609.

Nabawa and Florence proved to be less than one-tenth as susceptible as Canberra. Less than one-fifth as susceptible are Warchief, Waterman, and Roma Red.

The figures given for the susceptibility are only approximate owing to the limited number of trials and great variation of the figures in the trials. In arranging the wheat in groups, both mean and the extreme values are considered. Those placed in the moderately susceptible column are certainly less susceptibe than Canberra.

TABLE III.

HIGHLY RESISTANT.		RESISTANT.	
B.I.P.M. 2612	0·25 ± 0·17	Warchief	3·8 ± 2·45
B.I.P.M. 2604	1·1 ± 0·78	Waterman	5·6 ± 3·79
B.I.P.M. 2615	1·1 ± 0·78	Roma Red	10·1 ± 3·36
B.I.P.M. 2610	1·3 ± 0·69		
Nabawa	1·9 ± 0·86		
Florence	3·3 ± 1·30		
MODERATELY SUSCEPTIBLE.		**SUSCEPTIBLE.**	
B.I.P.M. 2608	10·0 ± 4·50	Warrior	40·5 ± 19·5
Bunge No. 1	15·4 ± 7·01	Barwang	53·4 ± 16·84
B.I.P.M. 2609	16·3 ± 4·90	Three Seas	54·1 ± 15·47
Currawa	18·0 ± 7·26	Gem	61·3 ± 16·90
Warren	19·5 ± 5·65	Patriot	63·0 ± 14·53
Pusa	22·5 ± 6·94	Merridan	69·9 ± 12·63
Amby	24·4 ± 5·37	Budd's Early	76·4 ± 16·80
Caliph	31·2 ± 13·51	Bobs-Flo Gl. 2613	82·5 ± 18·41
Novo	32·9 ± 7·48	Florida	89·2 ± 25·83
Pilot	33·9 ± 9·09	Coronation	97·6 ± 12·41
Pinto	35·6 ± 10·04	Canberra	100·0 ± 2·64
Clarendon	36·5 ± 12·51	Cleveland	110·4 ± 29·19
Beewar	38·7 ± 13·08	Watchman	133·8 ± 13·52
Gluyas	53·1 ± 7·86	Flora	141·3 ± 21·20
Booraloo	53·8 ± 6·30	Cedric	141·8 ± 29·20
Duke of York	57·5 ± 6·78	Piastre	145·5 ± 23·02

Experiment II.—Seed Treatment Trials.

Canberra wheat was used for this experiment, and with the exception of the seed for the Canberra free rows was shaken with flag smut spores at the same rate as in the susceptibility trials. Three pairs of Canberra free and three of Canberra infected were planted as distributed checks. Two rows of each of the following treatments were planted and in most cases a third row of treated seed subsequently reinfected.

Bluestone.—The seed was treated by immersion in a 1½ per cent. solution (1½ lb. to 10 gal.) of bluestone for three minutes. It was then allowed to dry before planting.

Bluestone Kept.—This was treated in the same manner as above, but the treatment was made on the 3rd of May and planting took place at Allora on the 10th and Roma on the 13th.

Bluestone Lime.—The bluestone treatment was the same as the two former and was then followed by immersion in 1 per cent. milk of lime for three minutes.

Formalin.—Ten minutes in a solution consisting of one part of commercial formalin in 400 parts of water.

Copper Carbonate—Tillantin R.—U.T. 685.—The seed was shaken with the various dusts at the rate of 2 oz. per bushel.

Hot Water.—The seed was soaked for five hours at room temperature and then maintained one lot at a temperature of 125 deg. Fahr. for ten minutes and the other at 129 deg. Fahr. for ten minutes.

Duplicate plantings were made at Allora and Roma each at the time of the first planting of the susceptibility trials and under the same conditions, except that, at Roma, the drills were watered to ensure germination. Two hundred seeds were planted per row, and the resultant plants counted so that the effect of seed treatment on germination could be observed. The final figures are given in Table IV.

TABLE IV.

PERCENTAGE GERMINATION OF EXPERIMENT II.

Treatment.	ROMA.		ALLORA.		Mean.
	1st Row.	2nd Row.	1st Row.	2nd Row.	
Bluestone	97·5	96·5	58·0	60·0	87·3
Bluestone subsequently infected ..	97·0	..	61·0	..	
Bluestone kept	89·5	96·0	59·5	60·0	76·2
Free untreated	97·5	95·5	63·0	67·0	80·7
Infected untreated	93·5	97·5	69·0	62·5	80·6
Bluestone lime	96·0	98·5	67·0	74·0	83·8
Formalin	88·0	91·5	69·0	59·0	76·0
Formalin subsequently infected ..	95·5	..	53·5	..	
Free untreated	96·5	95·5	55·5	56·0	75·8
Infected untreated	94·0	95·5	63·0	77·0	82·3
Copper carbonate	96·5	97·5	68·5	59·5	79·8
Copper carbonate infected	95·0	..	62·0	..	
Hot water 125° F.	65·0	62·5	47·5	43·5	53·0
Hot water 129° F.	65·0	59·5	33·5	34·0	48·0
Hot water 125° F. subsequently infected	63·5	..	36·0	..	..
Free untreated	94·5	92·5	64·0	67·0	79·5
Infected untreated	94·0	97·0	63·5	56·5	77·7
Tillantin R.	96·0	97·5	52·5	63·0	78·5
Tillantin R. subsequently infected ..	97·5	..	64·5	..	
U. T. 685	95·5	94·0	63·5	68·0	80·6
U. T. 685 subsequently infected ..	100·0	..	63·0	..	
Average of infected untreated ..	95·6		67·3		79·4

Examination of the germination results shows no reduction from treatment of seeds with the dusts: copper carbonate, Tillantin R., and U.T. 685. With formalin and blue stone the difference is so small that considerably more elaboration would be needed to prove a reduction. Treatment with lime after bluestone may make a difference under some conditions.

With the hot water treatment there was a consistent reduction of germination capacity, particularly marked at Roma, where the distributed checks varied from 92 per cent. to 97 per cent., whereas the three rows of seed treated with hot water at 125 deg. Fahr. registered 65 per cent., 62 per cent., and 63 per cent. It is to be noted that in the treatment the seed was not immediately cooled after treatment. Small subsidiary experiments were later carried out at the Department which proved that when the seed is cooled by quenching in cold water immediately after taking from the hot then the reduction in germination is not significant. The effect of such procedure on the effectiveness of the treatment has not been demonstrated in this series of experiments.

The amount of infection found in the rows is shown in Table V.

TABLE V.

Treatment.	PERCENTAGE INFECTION.		RELATIVE INFECTION ON SCALE AVERAGE UNTREATED INFECTED = 100.		Average.
	Roma.	Allora.	Roma.	Allora.	
Bluestone	0	0	0	0	0·7
Bluestone	0·6	0	2·8	0	
Bluestone subsequently infected ..	1·6	0·8	7·4	11·2	9·3
Bluestone kept	0	0	0	0	0
Bluestone kept	0	0	0	0	
Free untreated	0	0	0	0	0
Free untreated	0	0	0	0	
Infected untreated	15·5	5·7	71·6	81·5	81·5
Infected untreated	25·0	4·0	115·0	57·0	
Bluestone lime	1·2	0	5·5	0	3·9
Bluestone lime	0	0·7	0	10·0	
Formalin	0·6	0	2·7	0	0·7
Formalin	0	0	0	0	
Formalin subsequently infected ..	4·3	1·9	19·8	27·2	23·5
Free untreated	0	0	0	0	0
Free untreated	0	0	0	0	
Infected untreated	21·0	10·6	97·0	151·0	106·9
Infected untreated	24·8	4·6	114·0	65·8	
Copper carbonate	8·5	3·0	39·2	42·9	85·4
Copper carbonate	14·2	13·6	65·5	194·0	
Copper carbonate subsequently infected	33·5	12·1	154·0	173·0	163·5
Hot water 125° F.	0	0	0	0	0
Hot water 125° F.	0	0	0	0	
Hot water 129° F.	0	0	0	0	0
Hot water 129° F.	0	0	0	0	
Hot water 125° F. subsequently infected	33·6	9·7	154·0	138·0	146·0
Free untreated	0	0	0	0	0
Free untreated	0	0	0	0	
Infected untreated	20·0	12·0	92·5	171·0	112·4
Infected untreated	24·0	5·3	110·0	76·0	
Tillantin R.	12·1	6·7	55·8	95·8	90·4
Tillantin R.	16·9	9·3	78·0	132·0	
Tillantin R. subsequently infected ..	38·8	17·2	151·0	246·0	198·5
U. T. 685	23·5	8·7	108·0	124·0	120·5
U. T. 685	20·9	8·2	134·0	116·0	
U. T. 685 subsequently infected ..	27·6	16·0	127·0	228·0	177·5
Average infected untreated	21·7	7·0			

TABLE VI.

SUMMARY EXPERIMENT II.

Relative infection on scale average infected untreated = 100.

	Infected before Treatment.	Subsequently Reinfected.
Untreated	100·0	*
Bluestone	0·35	9·3
Bluestone lime	3·9	*
Formalin	0·7	23·5
Hot water 125° F.	0	146·0
Hot water 129° F.	0	*
Copper carbonate	85·4	163·5
Tillantin R.	90·4	198·5
U. T. 685	120·5	177·5

*No rows with these treatments subsequently reinfected were included in the experiment.

Hot water treatment for ten minutes at 129 deg. Fahr. appears to be the only absolute control of seed infection of this smut, having the further advantage of controlling all wheat smuts when carried with the seed. It has the disadvantages of impracticability under the conditions prevailing on the majority of wheat farms and of not controlling subsequent contamination.

Bluestone and formalin almost completely controlled the artificially heavy infection used in the experiment. Such seed would never be planted by an intelligent grower. These treatments would probably give practical control of the lighter infection usually present. Bluestone seemed to be the only treatment giving reasonable control of subsequent contamination. This is important since flag smut infection can take place from the soil.

Bluestone followed by lime appeared to be less effective than bluestone alone. The dust treatments were ineffective. Whether or not they will control light infections is now being tested.

Summary.

The outstanding results of the year's work are the confirmation in Queensland of the high degree of resistance of Nabawa and Florence which has been demonstrated in other States, and the demonstration of a similar or greater degree of resistance in promising Departmental crosses.

It has also been demonstrated that dust treatment of seed wheat is ineffective against heavy infections of flag smut. Probably the recent outbreak of flag smut would have been prevented had growers all regularly used the bluestone seed treatment. Copper carbonate has also been found by several experimentors to be ineffective against heavy infections of bunt.

OBITUARY.

MR. E. T. BELL, M.L.A.

The death of Mr. E. T. Bell, member for Fassifern in the Legislative Assembly, on 2nd May, removed from our midst a very fine personality and one who rendered good service to the State, both in peace and war.

In the countryside particularly he will be greatly missed, for probably no public man commanded such general respect, or enjoyed more genuine popular esteem. Round about the district he represented in Parliament for seventeen years, his loss is most deeply deplored, for there his genial, kindly nature and his many acts of disinterested and neighbourly kindness, his loyalty to the things we value most highly in public and private life were widely known and appreciated, and will long be remembered. His standards were high and measured up to lofty ideals of public service. He was content to give of his best to his native State, both as a pastoralist and a Parliamentarian, and during the great war he served Australia as a commissioned officer in the Navy.

The late Mr. Ernest Thomas Bell was born at Camboon, on the Dawson River, on 31st March, 1880. He was a son of the late Mr. J. T. M. Bell, a native of the Hawkesbury district of New South Wales, who was one of the early pioneers of the pastoral industry in Queensland, owning Coochin Coochin, Wallabella, Camboon, and Combargno Stations. He was educated at the Ipswich and Toowoomba Grammar Schools. Following a period of training on Coochin Coochin he became manager of Combargno Station, in the Roma district, holding that position for about three years—until, in 1903, on the death of his father, he returned to the home station and administered the affairs of all the properties of the late Mr. J. T. M. Bell, to which Planet Downs Station was subsequently added. At the by-election for Fassifern in 1913 the late Mr. Bell, in response to a widely supported request, offered himself as a candidate, and won by no fewer than 1,566 votes. Since then he had been re-elected at each general election. In 1910 he married a daughter of the Hon. W. F. Taylor, M.D., of Brisbane, formerly a member of the Legislative Council of Queensland, who, with several children, survives him.

The Acting Premier (Mr. R. M. King), on behalf of the Government, expressed profound regret at the loss through his untimely death of so valuable a member of the party as Mr. Bell, who, he said, was held in the highest esteem by both sections of the House. His genial and kindly nature endeared him to everyone, political friends and Opposition alike. Mr. Bell was a very useful member of the House; his knowledge of land and pastoral matters was of the utmost assistance to the Government, and his broad grasp of matters generally affecting the welfare of the State was also most useful to members of the Government.

"I regret the passing of Mr. Bell, who was a personal friend of mine for many years. The public life of Queensland is much the poorer for his loss," said Mr. King, who added that he was conveying the sympathy of the Cabinet to the widow, family, and relatives.

PLATE 76.—CATTLE COUNTRY, WEST MORETON, QUEENSLAND.

SHEEP ON THE COAST.

ADVICE TO FARMERS.

By J. H. HODGE, Instructor in Sheep and Wool.

AS a golden rule I would lay it down that the farmer must first learn that he has to choose a breed of sheep suitable for his country. It does not follow in the least that because a farmer in one locality has been successful with a certain breed of sheep, another farmer in a different place is going to do equally well with that breed. The right choice of a breed (possibly crossbreds) spells the difference between success and failure.

It may be taken in a general way that the pure merino is not suitable for farmers' sheep in the localities of which we are speaking, nor in districts where the rainfall is excessive.

Fat Lambs.

It must be borne in mind that the production of wool in farmers' flocks on the coastal areas is purely of a secondary consideration. Farmers should concentrate on fat lambs maturing at five and six months of age, and in this connection it is always advisable to have available some fodder crop so that the lambs come right away from the time of birth without a check.

It is desirable also that when choosing a breed the farmer should keep in mind the consequences of a bad season. That is, it may happen in a certain season that his lambs are not fit to market. In the selection of the right breed in this case the ewe lambs can be saved as future mothers in the flock, and the wether lambs (as wethers) fattened as opportunity offers.

The Right Flock.

Having selected the right breed, then (and in this case I would strongly urge the farmer to get the advice of the officers of the Department of Agriculture and Stock) it is essential to success that the prospective owner find the right flock. Here again official advice might be sought.

Having settled on a line and purchased, it is strongly urged that the sheep be drenched twice within eight days for stomach worms straight away. There are many prepared proprietary drenches on the market with full instruction as to dilution and application. If one of these drenches is proposed for use, it may be well for the farmer to write the Department, when advice will be sent as to whether such drench is suitable or otherwise. The Department recommends a drench, and full particulars as to ingredients, preparation, and method of application to the sheep can always be had on request. Let it be understood that the Department is on all occasions out to help the farmer with sheep, and let it be urged that the farmer make full use of the facilities provided.

Farmers' Wool.

With regard to the wool from the flock, the Department has an excellent scheme by which the farmer is assured of full value for his wool. All that is necessary at shearing time is for the farmer to send his clip unskirted to the Department, advising the Under Secretary of despatch.

Locks and bellies should be kept separate. All the rest of the wool may be baled and sent in as it comes off the sheep's back. A charge of 10s. per bale is made. It does not matter how small the parcel of wool is. Highest prices are assured, for under this scheme all small lots (or stars) are eliminated, as far as possible, and the wool is offered in the main catalogue. The scheme is available to all owners of 1,500 sheep and under.

The Cross Required.

In those parts of the coastal lands with a rainfall of over 45 inches, I would like to see farmers form their flocks with a Romney Marsh-Merino cross, the progeny of the Romney ram, on the big bold strong type of merino ewe. There is at present in Queensland great difficulty in getting the type of ewe required, but I have reason to believe that, in the near future, there will be available supplies of ewes (bred on the lines recommended) for the farmer.

Too much importance cannot be attached to this recommendation—i.e., the right ewe. In cases where farmers are already breeding with more or less success from the Merino, I would urge them to introduce a Romney Marsh ram with the idea of saving their ewe lambs as the basis of a future flock.

The Corriedale is a comparatively new breed, but has already proved itself an ideal general utility sheep where local conditions suit it. It grows a strong bulky fleece of commercial value, and the ewes are great mothers. I consider there is a great opportunity for some farmer to breed a pure flock of Corriedales in these areas, with the object in the near future of supplying other farmers with purebred stock.

If fat lambs are required with the Corriedale ewe as the basis of the flock, I would recommend the introduction of the Border Leicester or Dorset-horn ram. Both crosses throw fine early-maturing lambs, but in this case care would have to be exercised in seeing that the whole crop was ready as fat lambs.

The Main Handicaps.

The two main troubles in connection with sheep in these parts are likely to be stomach worms (already referred to) and dogs, both wild and domesticated.

If the paddocks where it is intended to run the sheep are not netted against dogs, yarding at night and a careful watch by day will have to be resorted to. Careful handling on all occasions is essential, and the sheep should be in the yard for as short a time as possible. It must always be remembered that although the breeding is a very fine thing, there is a true saying that ''half the breeding goes down the throat.'' In choosing a position for the yard be careful to see that it is on high well-drained land, as well sheltered as possible. This advice refers, too, to the drafting yard, which in all probability would be part and parcel of the ''sheep fold'' or night yard.

Should ticks or lice appear in the flock, advantage should be taken, where possible, of any dip which has been freshly prepared and before any cattle go through it.

Dips.

The cattle dip is not ideal for sheep on account of the tarry substance contained, but the sheep will stand the strength, and in small lots, and with the exercise of care, sheep may be put through with advantage for the purposes mentioned. Should the flock be large enough to warrant a dip, or could neighbours combine for the purpose, it would pay well to erect a cheap dip. These can be purchased (metal) in different lengths at different prices. Where small numbers are handled the cost of yards and dip should not be great. The dips recommended are well known, and full instructions are given with the material. In this case, again, if in doubt, consult the Department.

A shower dip suitable for a small owner can be very economically erected. This consists of a cement base built with a suitable fall to one corner in which is a cement well sufficiently deep to allow a pump to be used for the purpose of pumping the liquid back again to the tank. The top is perforated and a hand pump of sufficient strength is used. The sheep are gently crushed into the dip under the shower and the pump set to work. This shower dip is quite successful even with large flocks, and has the great advantage that even ewes heavy in lamb can be operated upon without injury. The cost to a farmer should be comparatively small. About six minutes under the shower and four minutes draining should prove satisfactory.

Fat Lambs.

Where a crop of fat lambs is the object of the farmer the greatest care should be taken to see that the lambs suffer no check from birth to market. For this purpose a fodder crop is urged.

Where it is possible to grow lucerne, nothing can beat it, and the farmer is recommended to grow this on any well-drained area where it has been proved, or to try it in an economical way even if none has been previously grown.

Lamb-marking (or castration of the ram lambs) forms one of the operations. This should be done with the greatest care and cleanliness, and should be carried out when the lambs are from a fortnight to a month old. A recognised antiseptic should form part of the equipment at marking time, and the knives and earmarkers frequently dipped in same. The yard itself should be clean, and all old wools, refuse, &c., burned. This is a precaution against tetanus or lockjaw. The operation itself should be conducted by a man of experience, and here again the Department is prepared to send an officer to give a demonstration.

The farmer should register an earmark. After the testicles are removed (and it is recommended to draw them with the teeth) and the earmark put in, the tail is docked about two inches from the rump. Great care has now to be exercised in the application of a preparation to the wounds. The substance used should be both curative and antiseptic.

A good dressing may be made from Stockholm tar, fat, and dip. Heat the tar and fat in equal proportions together and add the dip. Apply the dressing with a swab (on a stick) to the purse and tail.

Care after Marking.

After lamb-marking the lambs should be carefully examined daily to see that they have not been attacked by blowflies. Should such be the case all maggots should be removed, wool shorn from the affected parts, and the wounds again dressed with a solution of sheep dip or some other preparation recommended for the purpose. When sending lambs to market drive as slowly and carefully as possible. Never load the lambs in a heated condition.

Lambing Time.

With regard to the time for lambing in these coastal lands, June, July, or August are recommended as the most suitable months. With no check in the lambs, this should insure marketable lambs towards the end of the year, when the price can generally be relied upon to be the best. This would mean mating the rams in January, February, and March. In this connection, it is interesting to note that the long-wooled English breeds are shy breeders except at their own particular season. Our Australian Merinos, on the other hand, will mate at any season of the year.

Over a period of two years fat lambs have sold excellently in Brisbane from 15s. to £1 7s. 6d. per head. With the fleece, and taking it on a basis of 75 per cent. lambs, I do not think I am unduly optimistic in saying that a farmer should nett at least £1 per ewe, and probably, at present prices for lambs, more.

It is advisable where the sheep are not doing well, or some soil deficiency is proved, that the sheep be given a lick. Nauru phosphates and salt (not too coarse) in equal parts with the addition of, say, 1½ oz. iodine to the 100 lb., is a suitable lick. In addition to toning up the flock generally, a proportion, in the form of phosphoric acid, finds its way back to the land with benefit to the pastures.

Fat lambs intended for market or export should never be weaned. Straight from the teat to the block is the maxim in this trade. The ideal weight for a lamb at, say, five months is from 33 to 37 lb.

CARE OF THE CAR.

MACHINERY MANAGEMENT.

THE traveller through country districts of Australia, who happens to have any knowledge of machinery, is invariably amazed at the rough treatment meted out to all forms of machinery used in the Australian country.

Many years ago, when the horse was the farmer's chief assistant, the farmer who was not a good horse boss was somewhat despised by his neighbours. Unfortunately there is no such feeling with regard to machinery, and it is the general rule to see all sorts of machinery badly abused in the country districts of the State.

Admittedly no discomfort is caused to any living thing because a tractor goes unhoused all through a wet winter, but it is a fact that the pocket of the owner is badly hit when machinery is abused or neglected.

The motor car together with other machinery on the farm, comes in for its share of abuse and neglect and since the car is both an expensive and comparatively delicate piece of mechanism, its abuse and neglect costs the owner very dearly.

The Garage.

Any car, no matter how cheap, is worthy of a weatherproof garage. A building with wooden walls and a galvanised iron roof can be erected for a few pounds and it will save its price in twelve months.

The garage should be a complete building, however, and not a half-built shed with only a roof and one or two walls. It is not at all unusual to see a good car stabled alongside a house or a shed with possibly a few sheets of iron above it to keep off direct rain but without walls, thus the car is continually exposed to wind and moisture, and very often to the sunlight. If the owner of such a shed is approached and asked why he does not build a better one, he will almost invariably excuse himself with a story about shortage of cash for such improvements. The writer has no hestitation in saying that the man who cannot afford a decent shed for his car cannot afford a car.

The ill-effects of leaving a car in the weather continuously are that the paintwork perishes, the tyres perish, the woodwork shrinks, the upholstery and hood perish, the body rusts, and in fact, all steel parts rust, and the electrical wiring perishes. In short, the car quickly becomes a shabby wreck.

What has been said about the effects of neglect on the car applies also to the tractor, harvester, plough, or other farming machinery.

The reader who doubts the value of thorough care for machinery should do a little calculating as to the cost per annum of his machinery, motor-car included. He will readily see that by doubling the life of his plant he can save himself a few pounds a week.

To take proper care of the car a good supply of water should be available, and the bodywork should be washed at least once a week in order to remove mud and dust that might otherwise become almost a permanent portion of the car. Water supplied through a hose is the ideal supply for washing the car. Unfortunately many properties in country districts are lacking in a suitable source of water supply, but wherever there is a good well available a small pumping plant and a water reticulation scheme around the home is a wonderfully profitable investment.

The Repair Shop.

Many car owners to-day never touch their cars to do repair work, but prefer to leave it all to the local garage. This policy is probably a good one for the city man, but every farmer should be something of an amateur mechanic, as the modern farm has far too much machinery upon it not to require the care of an owner who knows something of machinery.

The first essential to a small workshop is a decent bench and vyce. The bench should be at least 6 feet long, 2 feet wide, and be supported by at least six legs of 3-inch by 3-inch or larger material.

The top of the bench should be made of timber at least 2 inches thick and to this top a good vyce should be screwed. A most serviceable type of vyce is one with 3-inch parallel jaws. The vyce should be arranged so that the top of the jaws are at about the same height above the floor as the elbows of the man who is going to use it.

A row of shelves at the back of the vyce, divided into compartments for nuts, bolts, screws, small tools, &c., is very useful. These shelves should contain the following tools:—Two 10-inch flat files, one rough, one smooth, a ¼-inch round file, and a small triangular file, also an engineer's hammer with a 1¼-lb. head, together with a selection of cold chisels and punches is absolutely necessary.

An assortment of reliable spanners is essential. A full set of both box and block spanners suitable for car repair and general work should range from three-sixteenth inch to five-eighth inch. Larger nuts than this size are comparatively rare, and a big screw wrench should suffice for handling the few that are met with. When buying spanners it is always advisable to buy the best, as the jaws of an inferior article are always liable to spread or break. The tool kit should also contain a variety of good screwdrivers, a pair of footprints, a pair of snips, a medium-sized soldering iron, a hacksaw and blades, and, last but not least, a small breast brace, together with a set of drills and a small emery wheel to grind the drills.

The tools mentioned are only a nucleus for a much larger kit which the amateur mechanic will purchase soon after he begins to take an interest in his repair work. Such tools as a forge, an anvil, a blow lamp or a large drilling machine are extremely useful in the hands of those who have some idea how to use them.

It does not need a very keen observer to realise that farming has been mechanised, particularly wheat-farming. It follows naturally that the good farmer must be a good amateur mechanic, as he has a car and much other machinery to care for. On every hand one hears the slogan "grow more wheat." The farmer realises that he must have a reasonable profit and to obtain this the wheat must be produced economically. No doubt there are numerous ways of doing this, but at least one way is to take more care of the farm machinery and so reduce expenditure on plant.—"RADIATOR," in "The Farmer and Setttler."

CLIMATOLOGICAL TABLE—APRIL, 1930.

SUPPLIED BY THE COMMONWEALTH OF AUSTRALIA METEOROLOGICAL BUREAU, BRISBANE.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·94	85	..	86	23,26	..	..	190	11
Herberton	..	76	59	80	1,9	56	15,26, 27,28	129	9
Rockhampton	30·04	84	63	87	25	53	27	193	6
Brisbane	30·08	78	60	84	25	55	13	225	9
Darling Downs.									
Dalby	30·09	77	51	83	1	37	27	198	7
Stanthorpe	..	70	47	80	3	33	27	387	11
Toowoomba	..	68	50	78	3	39	27	258	7
Mid-interior.									
Georgetown	29·93	91	62	94	9,11	56	12,28	..	..
Longreach	29·99	89	62	95	4	53	11,12,26	3	1
Mitchell	30·07	80	52	86	1,7	38	27	99	4
Western.									
Burketown	29·93	91	68	96	2,9	59	13	..	..
Boulia	29·97	90	60	97	21	51	27	..	..
Thargomindah	30·05	82	59	94	22	51	25	10	2

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING APRIL 1930 AND 1929, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April, 1930.	April, 1929.
North Coast.	In.		In.	In.
Atherton	4·30	29	0·53	5·52
Cairns	11·71	48	4·73	3·78
Cardwell	9·15	58	1·01	2·37
Cooktown	8·90	54	1·90	6·53
Herberton	3·95	43	1·29	0·99
Ingham	8·15	38	3·07	5·10
Innisfail	20·41	49	5·81	4·32
Mossman	9·02	17	1·15	4·29
Townsville	3·54	59	0	2·50
Central Coast.				
Ayr	2·68	43	0	6·23
Bowen	2·88	59	0·12	10·08
Charters Towers ..	1·63	48	0·11	2·17
Mackay	6·62	59	2·90	14·10
Proserpine	6·25	27	2·28	12·29
St. Lawrence.. ..	2·98	59	0·39	9·55
South Coast.				
Biggenden	2·19	31	0·76	9·05
Bundaberg	3·17	47	0·98	7·25
Brisbane	3·75	78	2·25	9·84
Caboolture	4·37	43	1·63	10·25
Childers	2·89	35	1·93	7·65
Crohamhurst ..	6·65	37	3·42	10·66
Esk	3·05	43	2·11	8·27
Gayndah	1·41	59	1·20	5·23
Gympie	3·44	60	1·06	9·92
Kilkivan	2·23	51	2·22	8·41
Maryborough ..	3·77	58	2·70	12·75

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April, 1930.	April, 1929.
South Coast—continued:	In.		In.	In.
Nambour	6·25	34	3·61	19·42
Nanango	1·92	48	0·72	4·47
Rockhampton ..	2·84	43	1·93	8·98
Woodford	4·56	43	1·66	8·84
Darling Downs.				
Dalby	1·30	60	1·98	2·96
Emu Vale	1·26	34	1·29	2·31
Jimbour	1·32	42	0·65	2·24
Miles	1·43	45	1·04	4·59
Stanthorpe	1·68	57	3·87	3·80
Toowoomba ..	2·54	58	2·58	4·96
Warwick	1·65	65	0·61	3·53
Maranoa.				
Roma	1·33	56	2·67	5·84
State Farms, &c.				
Bungeworgorai ..	1·28	16	2·02	6·42
Gatton College ..	1·80	31	2·71	4·37
Gindie	1·25	31	0·40	2·05
Hermitage	1·36	24	..	3·44
Kairi	4·28	16	0.12	0·90
Mackay Sugar Experiment Station ..	5·26	33	1·14	15·45
Warren	1·84	15	..	9·36

GEORGE G. BOND, Divisional Meteorologist

PLATE 77.—THE NARROWS AND MOUNT LARCOMBE, NEAR GLADSTONE, QUEENSLAND.

RURAL LIFE IN OTHER LANDS—XIII.

By the EDITOR.*

RAMBLES IN RURAL ENGLAND.

THESE notes are in the nature of a very brief review of experiences, impressions, and some observations gathered in the course of an unforgettable tour through some of the stock-raising and agricultural counties of England. The object of the tour was to continue a study, at first hand, of the principles, practice, and progress of pedigreed stock-breeding in the United Kingdom, as well as to observe British methods of general farming.

Though there was no lagging by the way, plenty of time was taken for careful observation and the sifting and assimilation of noteworthy facts. Each breeder visited was met amid his own herd or flock and his stock studied at close quarters on their home pastures.

While the tour was, primarily, one of observation and inquiry, one's happy experience was the meeting with farmers of the Old Land socially, as well as otherwise, and the resultant mutual removal of many misconceptions regarding personality, climate, stock breeding and rearing methods, and farming practice of our respective countries.

The Charm of the Old Land.

The good will and hospitality of English people encountered daily made one's comings and goings in beautiful rural England extremely pleasurable as well as profitable.

Perhaps one of the most useful experiences, apart from those of technical value to one hitherto unfavoured, was what one might call the "discovery" of England. Early impressions are gathered, as we all know, from what we read and hear. One had heard, for instance, that England was just a little wet island poked away somewhere up in the North Sea. England can be wet and England can be cold. England can also be warm and sunny and the year I spent there was one of a wonderful summer. It was a year in which one saw the splendid procession of the seasons, the clear definition of the one merging into the other; Nature's reawakening in the spring after her long sleep through the snows of winter, her arraying herself in the raiment of a glorious summer, and then the golden autumn and her triumphant progress through the time of harvest—a harvest that ripened that year into a generous fulfilment—to rest once more after the labour of her reign.

That year one was able to feel the charm of the Old Country in every seasonal mood, in the Cornish Riviera as well as on the bleak uplands of Northumberland; on the Sussex Downs and Surrey Hills as well as in the wolds of Yorkshire and the dales of Durham, and one learnt to appreciate profoundly the depth of the Englishman's love of England, equalling, perhaps, that of the Australian's love of Australia.

That year one was to meet for the first time, perhaps, the country Englishman of every social grade—the old time lord of the manor, now giving place to men of a new regime, and whose passing is not entirely unregretted by those who appreciate the part he has played in building up British agriculture; then there was the yeoman; and lastly the farm labourer, usually a very good man at his job. Their generous hospitality, friendliness, straight-forwardness, and all-round fine character made our temporary association, for us, one of the utmost pleasure.

Through Lincolnshire.

Our first halt was at an exceptionally well-managed property of 1,000 acres about 2 miles from the city of Lincoln. There was seen a noted herd of Lincoln Reds, a very fine breed of cattle already well known in Queensland. It seemed, however, that the breeder had to some extent sacrificed body in order to maintain his herd's milking characteristics. All had been bred true to colour and type, and, of the females, over 50 per cent. were 1,000-gallon cows.

After some time visiting places of historical interest and some famous industrial plants in and around the city of Lincoln, steps were turned northward through Market Rasen, Brocklesby, Coxhill Ferry, and across the Humber to Hull, where one had an opportunity of seeing something of the commercial greatness and the shipping facilities of that important seaport. It was interesting to learn that Australian wool is now conveyed through Hull direct to Bradford and other manufacturing centres by water, and that, generally, docking and shipping facilities had been designed towards stimulating oversea Dominion trade.

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* In a Radio Talk from 4QG.

The way through Lincolnshire provided many delightful scenes in a typically English countryside. There were many views of level lands well cultivated; of hills and dales interspersed with woods and fields of richest green. Shorthorns as well as the county breeds were running on many pastures.

In Yorkshire.

Continuing northward from Hull, Leconfield was visited. There mixed farming, of which the breeding of the famous Lincoln sheep was the main feature, was followed. The flocks were distinguished by big frames carrying heavy wool and would be a picture and a delight to the classer, freezer, and fancier. The rams for growth, conformation, and constitution were fit to be shown anywhere.

Two-year-old stud rams clipped, one was informed, an average of 30 lb. at the previous shearing. The ewes were true to type, well-grown and well-culled. The lambs were well-covered and, as a result of scientific feeding, lambing returns showed a remarkably high percentage. Altogether the outstanding qualities of Lincolns and Leicesters were very evident, the breeders' efforts being directed to meeting the requirements of the South American market for stud sheep.

On one farm one point in rearing calves, all fashionably bred of course, was especially noted. The breeder had made it a practice to keep in three cows in full milk, and on each of these cows three calves were reared. This was claimed to be a profitable plan from the point of view of the stud breeder catering for a strong oversea demand for his yearly crop of calves.

Horses, like every other animal on these holdings, showed blood. Shires were favoured in the heavy class and the two-year-olds and yearlings, all fashionably fathered, showed quality in every feature.

Pig-breeding was only a side line with some farmers but great care, so characteristic of English stock management, was extended also to this branch. Berkshire-British Black was the favoured cross and the progeny, as shown on farm records, proved most profitable at prices that, to the Australian, would seem only possible in the pig-raisers' paradise. Of the 640 acres in one farm seven-tenths were under fodders and cereals, and the balance laid down to pasture. The carrying capacity was rather more than an animal to the acre—a triumph, surely, of good farming. The improvements were modern. Seventeen hands were employed on the place and every labour-saving device, both in machinery and farm lay-out, from easy gate fastenings to motor tractor, was used.

This farm showed, further, that social amenities need not be sacrificed for a life on the land. The homestead, tree-embowered, ivy-clad, and set in velvety lawns proved also a centre of hospitality—genial, generous, and genuine—an impressive characteristic of so many homes in rural England.

Near Driffield, in the East Riding of Yorkshire, one was to meet with a hearty welcome from an enthusiastic Leicester flockmaster. In his sheds every beam and partition was adorned with prize certificates of every important agricultural and stock society in the United Kingdom. His sheep were excellent types of an excellent breed. The ordinary flock, noted descendants of Scarborough flocks, showed every characteristic of type more or less marked, but seemed light in shank for their great weight.

It was the practice on this farm to yard lambing ewes at night prior to lambing. They lambed in the yards where each ewe (they were valuable breeders, of course) received individual attention. The ewes and lambs were put on grass, those with two lambs being hand-fed, in addition, on roots. On this and other farms visited the usual practices necessary where winter conditions are rigorous were followed. Housing and hand-feeding were naturally included in the annual routine. What impressed one forcibly was the utmost care and attention given to the live stock generally. Farm animals, particularly sows, were given individual attention during their hours of trouble.

Our more genial climatic conditions in Queensland make it unnecessary at the moment to go into detail in regard to this aspect of English stock-raising practice. The careful and scientific feeding of stock was, however, an outstanding feature and, in this connection, I heard breeders both in England and Scotland, declare again and again that half the breeding of an animal goes down its neck. What struck one particularly was the immense carrying capacity of these English farms. On this holding of 1,100 acres were carried 1,100 sheep and 150 head of cattle. Of that area 800 acres were under the plough or in fallow. The farm was self-contained and the rotation usually followed was:—Seeds, wheat, barley, and manure; then roots, oats, seeds, top-dress.

In a wonderful old-world garden the preparation of soil scientifically was demonstrated and in an adjacent hothouse one found a home reminder in a healthy Australian blue-gum sapling strongly scented.

A Stock Farm in Durham.

At another place in Durham, Shorthorn cattle held pride of place, followed by Leicester and Oxford Downs sheep. This breeder's stock held an unbeaten record and many are numbered among Herd Book classics. His exports of both cattle and sheep to Canada and Australia have sustained that record, and their progeny are known in the principal show rings of both Dominions. The best cattle families in the United Kingdom were represented in the herd, though the Scottish blood predominated. Booth and Duthie blood was particularly noticeable, and the bulls looked equal to surviving any critical test. The youngsters particularly showed strongly every point of their breed and it was noticed that yearlings were still sucking. One already sold for 2,000 guineas was still drawing nourishment from its mother. The principle followed in this respect is that calves (that is for stud animals) should be allowed to suck while they will. The chief herd bull was a magnificent white of the ''Myrtle'' family, a particularly fine animal and his stock was in great demand. All the bulls, in fact, would arouse any stockman's enthusiasm. One animal had been sold as a yearling to a New South Wales buyer for 1,000 guineas. Another 15-months-old animal seen had already been sold to America for 2,000 guineas, while the whole herd had produced a long line of champions and 2,700 prize winners. On this farm were seen some of the finest stock, judging by show records, in Britain—good coloured typical Shorthorns built close to the ground and perfect in top and under lines. This breeder believed in family variety, and generally retained two animals or more of each family in order to keep the continuity of each in his herd. Fresh infusions were drawn largely from the famous Collynie Stud at Aberdeen.

Running calves with their mothers was not practised by this breeder. They were kept away from the cows except at feeding times, when they were allowed to obtain nourishment from their mothers or foster mothers. If the calves did not take all the milk, the cows were stripped to secure an even milk flow and retain their shape of show. The cattle were not rationed, but a sufficiency of artificial food—crushed oats and linseed cake—was always available. This breeder regarded milk as the cheapest food, for no labour is required in its feeding, and his idea as a stud breeder, of course, was that calf-rearing is more profitable than dairying. He aimed to rear five calves on a single cow, regarding this as possible. That, he told me, was a long way better than bucket-feeding, and the youngsters never go back in steady development.

He never picked his animals until they were seven or eight months old, for his experience was that the youngsters' critical period, or the time when their good points are not likely to be evident plainly, is from three to eight months.

A small flock of Leicester sheep on this place also aroused admiration. Strong in bone, they bore their very great weight somewhat better than those previously seen.

Here again was an object lesson in sound farm management and practice. Every acre of the 230 comprising the holding was returning a profit. Prosperity was evident and all the comfort of an English yeoman's home was apparent. Economy was the keynote. To each member of the household had been allotted the care of a particular department. Pigs and poultry, though sidelines only, also received as much care relatively as the pedigreed cattle.

[TO BE CONTINUED.]

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

INCUBATION.

By P. RUMBALL, Poultry Instructor.

SEASON TO INCUBATE.

This is perhaps the first phase that should be considered. Although incubation may be successfully practised throughout the year, the results obtained from the birds hatched is not always satisfactory. About the best months for hatching are July, August, and September. Heavy breeds hatched in June and light breeds in the early part of October will in some people's hands prove satisfactory. Chickens of any variety hatched in February or early in March also thrive, but unfortunately they commence producing during the period of plenty and generally moult at about the same time as birds which have done twelve months heavy lay.

The frequent fault of poultry raisers is to hatch in the latter part of October and sometimes November. Stock hatched then rarely thrive, and also take longer to mature than early hatched birds, with the result that their production period commences with the fall in prices of eggs.

Selecting Eggs for Hatching.

Care in the selection of eggs which are to produce the future layers should be exercised. They need to be selected for (*a*) size, (*b*) shape, (*c*) texture of shell, and (*d*) colour.

Although like does not produce like with any degree of certainty, constant selection along these lines tends to fix the qualities aimed at. Size is undoubtedly an inherited quality and one of the features which has an important bearing on successful poultry raising. Breeding birds should be selected early in life for size of egg, as it is only by this means that a strain of fowls can be built up which will lay a good marketable egg early in their pullet year. Do not be content with just using 2-oz. eggs. Aim at eggs which will average about 26 oz to the dozen. Although shape does not materially affect the value of eggs, a uniform article is desired for marketing. Shape, however, has a certain influence on successful incubation. With incubators, as a general rule, the higher the tray or eggs the greater the heat, therefore, if some plump eggs are set at the same time as rather long thin ones the hatching would be irregular owing to the greater heat received by the roundish eggs, they being higher on the tray. Texture of shell varies considerably with the feeding and general conditions of the stock, but it is also possible for this feature to be hereditary. Apart from this, uniform shell structure makes for improved hatches. Colour is not an important feature in Queensland in regard to sales, but from light breeds white-shelled eggs should be produced, tinted eggs being an indication of impurity of breed.

Keeping Eggs for Hatching.

Eggs for hatching purposes should not be kept for a longer period than ten days. If they were set when five days old better results could be expected than when ten days old. It is, however, necessary to keep them sometimes longer than five days and sometimes even longer than ten, therefore they need to be kept under the best of conditions. A uniform cool temperature is desirable, slightly under 60 degrees if possible. The room where they are stored should be dry and not moist. Although fresh air is desirable, direct currents with their drying effect are detrimental to good results. They may be stored on racks or in straw board filters. Where any numbers are to be kept they could be held in egg cases similar to those used for market purposse. The turning of them daily is essential when they are to be retained for any time. This is a simple matter if stored in cases, it being merely necessary to turn the case one side one day and the other the next.

Period of Incubation.—Hen eggs 21 days, English ducks 28, Muscovy ducks 34 to 35, geese 28 to 30, and turkey 30.

METHODS OF INCUBATION.

Incubation may be practised either by natural or artificial means. The necessity of having birds hatched at the most remunerative period and the constant improvement in our commercial breeds of poultry makes it increasingly difficult for the poultry raiser who desired to keep a 100 or so good laying hens to use the broody hen.

Natural Incubation.

The Sitting Hen.—Generally, when the hen is used for incubation she finds her own nest. The best plan is to allow her to continue using it, merely protecting her from rough weather. Her eggs, however, should be removed and replaced with eggs which come from the best of your stock. As she is expected to remain on the nest for a period of three weeks and will not make full use of dust baths, she should have a good dusting with some insect powder to destroy any lice. She should also have another dusting a few days before the chickens are due.

Red mite are possibly one of the most common and irritating parasites which trouble poultry. They multiply very rapidly when unchecked, and a sharp lookout should be kept for their presence, for if allowed to infest a broody hen the irritation will often cause her to leave her nest. Scaly leg is also a condition which is undesirable in the broody hen. The number of eggs to be used will naturally vary according to the size of the hen. The hen turns the eggs under her at frequent intervals, and when there are too many for her to cover properly those that get on to the outside of the nest will become chilled, resulting in the destruction of the embryo. The hen should be fed exclusively on a grain ration and have plenty of grit and water available. The best results will then be obtained by leaving her as much as possible to herself after giving attention to the foregoing particulars.

Artificial Incubation.

There are many reliable makes of incubators on the market which are sold with instructions for working. These instructions should be followed by the operator as they are prepared after tests made by the manufacturer. There are, however, features which apply in a general way to most makes.

Location of an Incubator.

The incubator should be set up in a room in which there is as little variation in temperatures as possible. If a special room is to be built it should have two roofs with a space of 5 inches or 6 inches between them. The outer overhanging several feet on all sides. This is better than a good ceiling as it allows of a constant current of air and at the same time keeps the direct rays of the sun off the walls. Ventilation should be provided by windows in the walls and vents in the inner roof. These can be operated according to the number of machines working in the room and the outside temperatures. Direct drafts, however, should be avoided. Where it is not desired to go to the expense of building a special incubator room, an enclosure can be made under the majority of the dwelling houses in Queensland. If it is situated under the centre of the house it is well protected from the sun, and the temperatures are therefore fairly uniform.

Heating of Incubator.

The majority of incubators are heated by kerosene lamps. The lamp should always be thoroughly cleaned, the burner boiled in soda water, and new wicks used for every hatch. In starting do so gradually. If a large flame is used for a start with the idea of heating the machine quickly it frequently leads to the smoking of the lamp. A good grade oil should always be used, and in adjusting the flame turn a little higher than required and then reduce to the desired height. This ensures that there will be no running up of the wick.

The lamp should be cleaned and filled early in the afternoon. By doing this all char of the wick is removed, giving greater heat during the cold night and at the same time it gives the operator the opportunity of making sure that the lamps are correctly adjusted before retiring for the night. Do not trim the wick with scissors, use a match to rub off the charred crust, and thoroughly clean the hands before handling eggs, otherwise the eggs may become smeared with oil with the resulting injury to the growing embryo.

Beginning of Hatch.

Heat up the machine a couple of days before it is desired to set eggs, and after the machine is thoroughly warmed up commence to adjust the regulator until the temperature remains steadily at 102 degrees Fahr. with the bulb of the thermometer on a level with the top of the eggs. When the operator is sure that the regulator is correct the eggs can be set. This is better done in the morning so that the eggs will become warm and the machine again regulated before retiring. When the eggs are placed in the machine the temperature will drop, but the regulator should not be interfered with. All subsequent regulation should be done by the adjustment of the flame. Do not place too much work on any system of regulations; it has its limit of capacity to adjust temperature.

Thermometers.

All thermometers should be tested at convenient intervals. This can be done by any person having a clinical thermometer by placing the clinical and incubator thermometers in a basin of warm water gradually increasing the temperature until the clinical thermometer registers 102 degrees and observe the temperature of the incubator thermometer. If the latter registers a degree or so either way, allowance should be made by the operator for this discrepancy. Incorrect thermometers have been responsible for many poor hatches, and even though a new machine is just purchased do not take it for granted that the thermometers supplied are correct.

Temperature.

Temperatures are controlled by capsules or thermostat. Occasionally these get out of order by the former leaking and losing some of the liquid content or by the latter becoming bent. These should be examined particularly when regular temperatures cannot be maintained to ascertain if they are in correct working order. The temperature should stand at 102 to 102½ during the hatch when the bulb of the thermometer is hung as previously stated. During the latter period of the hatch (the last two days) the temperature may run up to as high as 104 degrees. This need not worry the operator as it is caused by the additional animal heat from the live embryo.

Turning.

Begin turning the eggs at about forty-eight hours after setting, and continue to do so twice per day until the nineteenth day unless the eggs are starting to pip. When the eggs are placed in an incubator tray, they should be placed on an angle of about 45 degrees large end up. To turn these it is necessary to handle every individual egg, but after testing and the infertile eggs are removed, they can easily be gently rolled around with the hand. A complete turn is not necessary, it being sufficient only to alter the position of the egg to prevent the germ sticking to the inner lining of the shell.

Cooling.

The cooling of the eggs is merely another method of giving the eggs a thorough airing with the consequent strengthening of the embryo. The necessity of airing varies with the make of the machine owing to the variation in the supply of ventilation. It is, however, important to remember that for the first seven days very little airing is required. The time taken in turning the eggs from the third to seventh day is usually enough airing. After this period the eggs can be kept out of the machine until all burning heat has left them. The period necessary will vary according to the length of time the eggs have been in the incubator, but after returning the eggs to the machine the temperature should have reached the desired height within an hour. In airing, place the tray of eggs on a table. Do not allow a portion of the tray to overhang, otherwise some may become chilled owing to the greater circulation of air. Airing should be practised up until the nineteenth day, but if eggs are then chipping they should not be aired.

Testing.

This should be done on the seventh day. It can be done at an earlier stage but the time necessary to do this work may result in chilling, and also the germ is not so easily distinguished particularly in dark-shelled eggs as on the seventh day. All infertile eggs and dead germs can now be removed. To test, a piece of cardboard having a hole in it similar in shape to that of an egg but a trifle smaller should be held between a lamp and the egg to be tested. An infertile egg will be perfectly clear, a fertile egg will have a dark movable spot about the size of the head of a match with numerous blood vessels radiating from it, while a dead germ will show as a blood ring or streak and generally stationary.

Ventilation and Moisture.

These are both interlocked. If a machine has a rapid circulation of air through it, it will require more moisture than a machine in which the circulation of air is slow. The reason why moisture is supplied is to prevent a too rapid evaporation of the moisture content of the egg. Undue evaporation of the egg content is detrimental to good hatches and to correct development of the embryo. Enlargement of the air cell naturally takes place due to evaporation of the moisture content and the escape of carbon dioxide through the shell. This enlargement can easily be judged when testing, and if too great restrict the air circulation or increase the moisture content of the air. Many machines are supplied with moisture trays. These trays should be filled from the first of the hatch and refilled at frequent intervals. Where moisture trays are not supplied the air which passes into the machine is charged with a certain amount of moisture. To charge the air with moisture for this variety of machine the floor should be well wetted daily. Good ventilation is equally essential for the growth of the chicken within the egg as it is for the development of the chick when hatched. Without oxygen the changing of the egg content into a lusty chicken is impossible. If a fertile egg is examined on the seventh day a network of blood vessels can be seen near the shell and near the air cell. The blood stream not only converts the food into the embyro but it carries off the waste product (carbon dioxide), and without a good circulation of air this poisonous gas is not removed sufficiently fast, and consequently has a weakening effect on the developing embryo. It will be understood that the more advanced the embyro is the greater is the need of oxygen and the greater will be the amount of carbon dioxide given off; therefore, what will be the correct ventilation for eggs, say, a week old will not suffice when the eggs are in the third week of development. The increasing of the ventilation at this period will also assist in the regulation of the temperature of the incubator. Again, when the chicks hatch the ventilation should be increased, and if the chicks still pant the door of the machine could be slightly open and fixed in that position.

The Hatch.

After the last turning, on the nineteenth day, close the incubator and do not disturb it until the hatch is over. When the chicks have dried off give all the ventilation possible, darken the doors to prevent them picking at droppings or the toes on one another. It is as well to let them remain under this condition for about twenty-four hours, when they should be removed to the brooder. In doing so take every precaution to prevent them being chilled, as chills at this stage would prove disastrous.

Disinfection.

Immediately the chickens have been removed from the machine it should be thoroughly cleansed and disinfected. A good disinfectant is formalin. Any other good coal tar disinfectant may be used. The machine should then be closed up for a while to induce the fumes to penetrate every crack and corner, then allowed to dry and aired thoroughly before being used again.

RICE FOR POULTRY—SOME FEEDING EXPERIMENTS.

A five months' test of feeding paddy rice to poultry has just been concluded at the Government Poultry Farm, Seven Hills, New South Wales. Three groups, each of thirty White Leghorns as even as possible as regards age, condition, and general conformation, were fed for the evening ration as follows:—No. 1 Group, all rice; No. 2 Group, 50 per cent. rice and 50 per cent. wheat and maize in the proportion of two of wheat to one of maize; No. 3 Group, 75 per cent. wheat and 25 per cent. maize.

While the experiment could not be continued long enough for conclusive results to be obtained, the indications were that no harmful results followed feeding rice to the extent of 50 per cent. of the evening grain ration, and that the feeding of all rice for the evening feed had no ill effects on the health of the birds, though egg production suffered to some extent. The actual figures for the three groups for the five months of the test were:—All rice pens, 2,093 eggs; 50 per cent. rice pens, 2,322 eggs; wheat and maize (check) pens, 2,390 eggs.

Commenting on the results, the New South Wales State Poultry Expert writes that rice appears a fairly safe substitute at times of high feed costs, though at the present time all supplies have been used. Only a limited quantity of rice is likely to be sold as stock food, though larger supplies are likely to be available towards the end of the year.

MORTALITY IN YOUNG PIGS.

By E. J. SHELTON, Senior Instructor in Pig Raising.

The use of crossbred or mongrel boars and of breeding sows indiscriminately selected without any reference to their capacity to breed healthy, well-developed stock, is referred to fully in the following reply to an inquiry relative to a farmer who had suffered considerable losses from pigs dead at birth or born too weak to survive, and from sows that failed to breed or if they bred failed to make a satisfactory job of rearing their litters. The reply being of general interest is published in full.

It is evident that the breeding of your pigs is largely at fault. We do not recommend the use of crossbred boars at all at any time, for the results are invariably unsatisfactory, particularly where the boar and sows are closely related; especially is this the case where records of breeding are not kept and where the business is carried on on other than up-to-date lines. At any rate, there would be every possible advantage in culling your crossbred boar and replacing him with an animal of up-to-date type from a reliable stud. If we can assist you in securing quotations or in selecting a suitable boar, we shall be only too pleased to do so on receipt of your advice. We think that you would be well advised to cull the sows also, for they have evidently weakened as a result of the severe climatic conditions recently experienced in your district.

Possibly the feeding of your stock may be at fault, consequently in any treatment recommended we would suggest a change of food, and that attention be given to improving the quality and possibly the quantity of food used.

Faulty Feeding.

We have no record of green bananas having caused trouble with breeding sows, but would not recommend that the bananas be given too freely at any time. It would be better to allow them to ripen somewhat before use and give them in conjunction with concentrated feeding stuff. Perhaps some of the pumpkins may have decayed and possibly the skim-milk tank may be in a filthy condition, carrying a coating of decaying protein matter that is poisonous and likely to cause severe trouble, particularly among breeding sows close to farrowing. Then, again, the sows may have been chased by a dog and may have been injured internally by jumping over logs or crushing one another in an attempt to rush through a narrow gateway. We have no record of the milk from cows inoculated for redwater having caused trouble among pigs and do not think this is a likely cause. We presume there are no poisonous weeds about the pig paddock that will be likely to cause trouble, though now and then we have records of ''ergotised'' grasses and crops causing trouble. Ergotised rye has, on numerous occasions, been reported as a probable cause of abortion in stock.

Pigs Dead at Birth.

It is evident this trouble is entirely due to faulty diet and to improper handling of the sow.

It is quite unnatural for a breeding sow to produce dead pigs at birth and there must be a cause for this trouble, hence we look to faulty feeding as the most probable cause. Many sows, for instance, receive no other food than skim milk, and this is often diluted with water. This ration is quite unsuitable and inadequate. Skim milk should never be diluted with water, for its feeding value is certainly not increased, and the feeding of a large quantity of weak swill only creates digestive disorders and leads to an intense craving for bulky foods.

Many sows are compelled to run in a bare yard in which there is no grass or succulent herbage, nor any suitable mineral matters (lime, phosphates, and other bone-forming materials). Again, other sows are turned out into lucerne paddocks and have no concentrated (heat and energy-producing) foods; and in other instances, though there is good variety in the ration, the sow is unable to provide the necessary sustenance for her young owing to a lack of vitamins.

The various Departments of Agriculture publish a number of valuable pamphlets on the breeding and feeding of pigs, which may be procured by writing to the Department at any time.

In a general way it does not pay to retain sows as breeders that fail to give satisfactory results; it is quicker and better to cull them and introduce better and more reliable strains.

Good reliable breeding stock can be purchased almost anywhere in the pig-raising districts throughout Australia at prices well within the reach of farmers, and no attempt should be made to continue on with unprofitable stock while better stock can be procured at these rates. The old rule of ''Do it now'' is well worth serious consideration.

THE MILKING MACHINE—THE CUP AS "HEART AND BRAIN."

A writer in the "New Zealand Exporter" states that what a large number of farmers fail to realise is that the cup is the heart and brain of the plant; it is, in fact, the milking machine, and on it alone depends the success or failure of the plant.

The writer considers that the use of cups fitted with air admission mouthpieces should be made compulsory.

Metal mouthpieces, he says, can be fitted to almost any standard make of cup, and the air admission can be put in by the farmer himself. Only a pinprick is required, and can be made by driving the point of a darning needle through the side of the mouthpiece, or by the use of a fine watchmaker's drill.

The effect of this is to cause a small rush of air down the cup, driving the milk clean away from the teat as it is drawn out, and also, it practically releases all pressure in the teat between pulsations. When the cups are removed the teats will be found soft, dry, and in their natural colour.

With this form of cup the pressure must be raised to 17 lb. to the inch, and cups with air admission, working at as high as 19 lb., are far and away easier on the cow than ordinary cups working at 13 lb. or 14 lb.

Air admission cups will not hang on the average cow of their own accord. During the period when the pressure is released they will fall off unless supported on a stool or hung to an overhead wire.

Many dairymen boast of the fact that their cups never fall off, but did they know the extra strain imposed on their cows by this type of cup, and the extra necessary amount of stripping they have to do, they would in most instances go to the little extra trouble entailed in supporting the cups.

Another very important point is to remove the cups immediately the flow of milk ceases. To leave the cups dragging away at empty teats is simply asking for trouble, and trouble in plenty will follow.

Inflations should be changed at the least three times a season, and tightened once every month or six weeks. Trying to make stretched half-rotten inflations last out another month is the very worst type of false economy, especially towards the end of the season.

It should always be borne in mind that the more milk a cow gives out the bigger her flow, the more efficient the cups have to be to handle their job. Any old "half-pie" machine will milk heifers or poor cows, but after the second or third calving some of these animals will start holding up their milk. Generally the farmer will blame the cow, whereas ninety-nine times out of a hundred the fault lies in his cups.

Through the milk not being taken freely from the teat the lacteal passages in the udder become numbed and the flow of milk ceases. If stripping be prolonged for a minute or so the numbness wears off and the milk comes away again. If this sort of thing continues for long the cow will develop the habit of holding up her milk, and it will take a good machine and a very patient operator to break her of it.

There are odd cases where, owing to some peculiarity of the udder, numbness will be cured by the squeezing tendency of the mouthpiece, in which case a different shaped cup may be tried with good results.

There is some difference of opinion as to whether the air inlet in the claw should be retained along with the air admission mouthpiece. Personally, I do not think it matters greatly one way or the other, but for safety's sake would advise that both be used.

Pulsator speed should be absolutely regular if possible, with no variation from the beginning until the end of the season. With heavy milkers it is better to err on the slow side, for forty to forty-two pulsations a minute being most satisfactory.

The time some farmers take to put through their herds is scandalous. I have heard of three milkers taking two and a-half to three hours to milk sixty cows, using a four-cow plant. The writer with one youthful assistant has put through seventy-five cows in one hour thirty minutes, engine running time, and no skimping the job at that!

If we get over three gallons of strippings off the lot we go looking for the reason, and it is never hard to find. Air holes blocked, inflation slack or engine gaining speed—one of these three will generally be found to be the cause of the extra strippings.

THE BUSINESS OF DAIRYING—A FARMER'S VIEW.

"Dairy farming to-day is a business, and to be successful the farmer has to conduct his operations on business lines." With the foregoing as preface, Mr. A. S. Pankhurst, of Singleton, New South Wales, at a recent Agricultural Bureau conference, drew attention to what experience had impressed him as some of the most important points.

The holding having been acquired, the site for the farm buildings should be chosen. It was commonly believed that small holdings were essential, and it was safe to assume that half a mile from grazing to milking bails was a maximum. The cow was one of nature's machines for distilling milk—not a working bullock —and excessive travelling lessened the milk yield, and probably the cream yield also. However, by judicious placing of the buildings on flat land it was possible to occupy 1,000 acres as one dairy; the area should be split across each way to make four 250-acre paddocks, and the buildings placed centrally, with access to each paddock.

In hilly country it was unwise to build the bails at the top of the hill. Cows grazed up hill, and used less energy when driven down hill to the bails than up hill, and exhausted cows did not give all their milk.

It was not always advisable to place the buildings in the most convenient position in relation to the road, as was sometimes done. They should be located in the position most convenient for the cows, even if not convenient to the road.

The matter of breeds was too big to be discussed in the time available, but really did not matter so long as testing and improvement were carried out. Cows were only given by nature sufficient milk to rear their young, and there was always a tendency to throw back. To maintain the present standard of development and to improve it, testing and selection were essential.

To a young man starting, Mr. Pankhurst offered the advice "breed your own heifers," and rear them only from cows of high production capacity. Select the sire as well as the dam from high-producing families, caring also for constitution. High production as well as other things seemed to go in families.

He had had experience with a strain that had always shown six teats; four were enough, and the two extra were superfluous, and were troublesome to dry off. He had snipped them off with distinct advantage, and had never known an animal to get a hard lump in the udder as a consequence.

Discussing the age at which to breed, Mr. Pankhurst said that quality of country affected development. If, under normal conditions, the animals were allowed to go to three and a-half years before breeding, a magnificently developed animal resulted, but there was a tendency to throw towards beef, especially if carried on for several generations. His experience had been that the best age to breed was at two years of age or a little under.

"Feed heavily," the speaker advised. "You must put in to take out, and do not dry the cows off too early." It was wise to get them into the habit of long lactation periods early in their lives. He was not in favour of never drying off, as was practised by some, for it weakened the calf.

When the heifers came in, it was not wise always to assume that, because they were of a good strain, they would be good producers. In these days there was no room for "boarders" on the dairy farm, and the only way to detect them was to join up with a herd-testing unit and test every heifer.

Discussing some aspects of general management, Mr. Pankhurst said he had always found it better to take the "raw edge" off the cows' appetites before putting them on to lucerne, but if that was not possible he had prevented "bloat" by cutting the lucerne twenty-four hours ahead of feeding, and stacking, tramping, and sweating to get rid of the gas. The cows should be fed as soon as they were turned out of the bails. He had experimented and found that by waiting an hour and a-half before feeding the yield was 2 or 3 gallons less out of a total of 200 gallons. In winter the cows had to lie down and wait, cold and empty, and even in summer time was lost, while later in the day the dew was off the grass and the sun was hotter.

The highly-developed modern cow was a lazy animal and wanted lazy conditions. Unless a cow came to its full potential production within four weeks of calving it had been his experience that she never would get to it. The cows should be fed well when they first came in and before they calved, so that they could store supplies for subsequent milk production.

THE ROYAL SOCIETY OF QUEENSLAND.

The Ordinary Monthly Meeting was held in the Geology Lecture Theatre of the University on Monday, 28th April. Dr. Herbert was in the chair, and about twenty-five members were present. The following were proposed for ordinary membership:—Messrs. E. A. O'Connor, M.Sc., and M. White, M.Sc., proposed by Dr. Jones and Mr. Perkins; Dr. W. H. Steel, proposed by Mr. Perkins and Prof. Lowson. Misses F. E. Scott and E. M. Ferricks were proposed for associate membership by Messrs. Perkins and Cayzer. Messrs. A. J. Stoney, B.E.E., and E. M Shepherd and Dr. J. M. Roe were unanimously elected ordinary members of the Society.

Mr. H. A. Longman exhibited two somewhat abraded otoliths of a freshwater catfish, *Tandanus* sp., which had been found in alluvium at Lakes Creek, Rockhampton, by Mr. F. Jardine, who had sent them to the Queensland Museum. Generic identification was established by direct comparison with otoliths or "ear-stones" taken from recently captured catfishes.

Dr. E. O. Marks exhibited the anterior half of a stone axe, found near the junction of Ewen Creek and Stanley River, near Peachester. The cutting edge had been fashioned entirely by chipping. All other recorded stone axes from Queensland have been formed by grinding. This exhibit was commented on by Mr. Longman.

Dr. W. H. Bryan read extracts from a paper by E. C. Tommerup, B.Sc., A.A.C., entitled "A Geological Reconnaissance of the Linville-Nanango District."

This paper deals with the geology of a large area situated between Linville and Nanango, Queensland, the information being gathered during numerous journeys made by the writer while engaged in making traverses of the district as an officer of the Queensland Forest Service.

The writer has attempted to correlate and classify the various rock formations of the district, but does not regard the classification as either complete or final.

The oldest rocks in the area are representatives of the Brisbane Schists which occur between Yarraman and Wondai. Next in succession (between Yarraman and Esk) there are several outcrops of slates which probably belong to the Gympie Series. Whether these were deposited *in situ* or were faulted into their present positions is not clear.

These were followed by the Andesitic Stage of the Esk Series, which is typically developed near Marbletop, east of Nanango. The writer was able to follow the massive andesites and andesitic agglomerates of this stage from Goomeri to the head of the Brisbane River and beyond Mount Stanley at least as far as the junction of Avoca Creek with the Brisbane River.

The overlying Shale Stage of the Esk Series was examined by the writer at a number of different localities within the area described, among them being Upper Yarraman Creek, where a small seam of coal is included in the section. Many of the conglomerates associated with the shales contain numerous pebbles of milky quartz, jaspers, and other representatives of the Brisbane Schists, together with others, derived apparently from the Gympie Slates.

The igneous rocks of the area fall naturally into three groups—viz.: (*a*) Granodiorites, (*b*) Porphyrites, (*c*) Basalts. The granodiorites are younger than the Gympie Series, which they intrude, but are older than the overlying Esk Series. The age of the porphyrite intrusions is not clear. They are apparently closely associated with the granodiorites, although they are probably somewhat older. On the other hand, they may possibly prove to be related to the Andesitic Stage, which is restricted to the eastern part of the area. The basalts outcrop along the Cooyar Range and elsewhere, and overlie the Shale Stage of the Esk Series.

The paper is illustrated by a sketch-section from Tarong to Taromeo, and by geological and contour sketch maps.

Miss Dorothy Hill, M.Sc., read a paper entitled "The Development of the Esk Series between Esk and Linville, with Reference to the Possible Occurrence of Workable Coal."

In the Brisbane Valley, between Esk and Linville, a series of Triassic rocks is trough faulted along the north-westerly grain of the country into the Palæozoic (including Permo-Carboniferous) formations. These Triassic rocks, the Esk Series, are freshwater basin deposits laid down by rapidly changing currents, with intensive contemporaneous volcanic activity. The Lower Esk Series is typified by very intense andesitic activity, with the formation of a great thickness of peculiar andesitic boulder beds, with sedimentary deposits being formed during periods of temporary cessation of volcanic activity. The strictly conformable Upper Esk Series, however, is typified by a thick development of rapidly varying sedimentary deposits, with interbedded flows and tuffs resultant from intermittent trachytic activity. Above the Upper Esk Series the Bundanba sandstones, now all eroded away except from the southern part of the area west of Esk, were deposited without angular unconformity.

In addition to the trough faulting, the Esk Series has been strongly affected by sharp north-westerly directed anticlinal fracturing, accompanied by the intrusion of an important series of hypabyssal rocks, the Brisbane Valley Porphyrites, closely related in mineralogical type to the flows and tuffs of the period of sedimentation. The time relations of the trough faulting and anticlinal fracturing are unknown, but they both occurred before the extrusion of the Tertiary rhyolites.

The conditions of deposition and the type of folding of the Esk Series do not promise well for the occurrence of a large field of workable coal, but some of the synclinal areas are worth more detailed mapping on the chance of the discovery of a deposit large enough to support a small colliery.

These papers were discussed by Prof. Richards, Drs. Bryan, Whitehouse, and Marks, and Messrs. Denmead, Bennett, and Dunstan.

A paper, "Essential Oils from the Queensland Flora, Part 1, *Baeckea virgata*," by T. G. H. Jones, D.Sc., and M. White, M.Sc., was laid on the table.

1,560 ccs. of oil, representing a yield of .88 per cent., were distilled from 353 lb. of the leaves. The constants recorded for the oil are—

$[d]_D = +16.5$; $N_D^{20} = 1.4742$; Acetyl No. = 41; Ester No. = Nil;

Density = .9021.

Examination of the oil showed the presence of d α-pinene 50-60 per cent., cineol 30 per cent., with pino-carveol, aromadendrene, and sesquiterpene alcohol in smaller quantities.

Prof. H. C. Richards communicated a short paper, "A Record of Graptolites from Mount Isa," by R. A. Keble.

A sample of fine, thinly-bedded sandstone with some of the laminations completely silicified and showing galena, and with some of the others more or less stained with ferric oxide, was found last summer on a spoil dump at Mount Isa by Mr. J. O'M. Lyons, and was subsequently handed to Mr. R. A. Keble by Mr. E. Broadhurst.

Mr. Keble regards the face of the specimen as showing graptolites preserved either as impressions or as films light-red in colour.

There are about fifty polyparies in all, poorly preserved, but many showing both proximal and distal extremities, and one or two showing thecal details.

They all belong to the Monograptidæ, and, although absolute specific determination is unwise, Mr. Keble has no hesitation in citing *monograptus cf. halli*, Barr and *Monograptus cf. undulatus* E. and W.

On this evidence he regards the age of the Mount Isa beds as being Silurian, and mentions that M. cf. halli occurs in shale approximately 1,000 ft. above the base of the Silurian in Victoria at Jackson's Creek and on the Wood's Point Goldfield. He also regards the European equivalent of the Mount Isa beds as approximately zone 21 near the top of the Llandovery.

Especially since the finding of the Cambrian trilobites at the Templeton River the Mount Isa beds have been regarded very generally as Pre-Cambrian in age. On this account, and owing to the association of ore-bodies of much importance, the determination is of considerable interest.

In communicating the paper Professor Richards summarised the evidence for the existing general idea as to the Pre-Cambrian age of the Mount Isa beds, and especially considered the relationship between these steeply dipping beds and the gently undulating fine grits of Middle Cambrian age at the Templeton River a few miles to the west of Mount Isa.

The results of the traverses made by Messrs. Shepherd and Ridgway, of the Queensland Geological Survey, and of Mr. J. B. Wadley in the same region were considered, and possible interpretations of these in terms of a Silurian age for the steeply inclined Mount Isa beds were put forward.

Considerable discussion took place, and general disagreement with the determination of the specimen as graptolitic in character was expressed by several members, especially Dr. F. W. Whitehouse, Mr. B. Dunstan, and Mr. E. C. Saint-Smith.

The firstnamed considered the specimen organic, but he could not believe it to be a graptolite, particularly a species of *Monograptus*. Messrs. Dunstan and Saint-Smith regarded the specimen as purely inorganic, and pointed out that much search had been made for graptolites and other fossils at Mount Isa, and, although material similar to the specimen under discussion had been seen, the structures were considered to be purely inorganic.

Answers to Correspondents.

BOTANY.

The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—

Clover *(Desmodium triflorum).*

T.F.D. (Beaudesert)—

Your clover specimen is *Desmodium triflorum,* a species of Tick Trefoil common in many warm countries and of recent years found in Australia. It is probably introduced and seems to be on the increase. In the pastures of coastal Queensland, to which it makes a valuable addition, stock are very fond of it and it is nutritious. The only disadvantage is that it grows so close to the ground. The name Tick Trefoil as applied to species of the genus refers to the pods breaking off and being carried about, thus disseminating the plant.

Fish Weed. Peppercress. Yellow Weed.

A.M.D. (Boonah)—Your specimens are:—

1. *Chenopodium triangulare.*—Fish Weed. A native plant generally looked upon as rather a useful herb in the average mixed native pasture. It gives rather a weedy or somewhat ‘‘fishy’’ flavour to milk and butter, hence the vernacular. Apart from this it is a useful plant and makes good hay.
2. *Lepidium ruderale.*—The Peppercress. Gives a strong mustard or turnip flavour to milk, otherwise a useful pasture herb.
3. *Galinsoga parviflora.*—Yellow Weed. Generally looked upon as a useful fodder, especially as green feed for poultry.

Grass *(Chloris virgata).*

E.G.H.C. (Grandchester)—

Your specimen is *Chloris virgata,* a vigorous grass, closely allied to the ordinary Rhodes grass. It is of annual duration, however, and does not seem to compare with the ordinary Rhodes grass as regards palatability. It is moderately common in Queensland and is mostly seen as a stray along railway lines, on the edge of cultivation paddocks, and so forth. It has no advantages over the ordinary Rhodes grass. In fact this latter is generally regarded as far preferable as a fodder.

‘Bindy-Eye.’’

B. (Brisbane)—

The term ‘‘Bindy-eye’’ was originally applied to several plants of the genus *Calotis* on the Darling Downs, particularly to *C. lappulacea, C. scapigera,* and *C. cuneifolia.* These are plants belonging to the large family Compositae and the flower heads die off leaving the ‘‘seeds’’ or fruitlets to ripen into burrs. Each little ‘‘seed’’ or fruitlet is provided with its own bristles. The name, however, is now applied to quite a number of burr plants in Western Queensland and in Central Queensland about Barcaldine, Longreach, &c.; the term is mostly applied to a tall-growing plant, *Bassia quinquecuspis,* which breaks off at the base and rolls about in the ordinary ‘‘roly-poly’’ fashion when ripe. With regard to the spelling of the name this is doubtful. In Angus and Robertson's Encyclopaedia you will find a note under the heading *Calotis* in which it states: ‘‘‘Bindi eye’ or ‘Bindei’—the spelling is doubtful.’’

A Native Orchid.

Inquirer (Brisbane)—

Your specimen of native arrowroot forwarded represents the pseudo-bulbs of a native orchid, *Cymbidium albuciflorum.* These are sometimes chewed by people in the bush as a cure for diarrhœa and dysentery, and were used in the early days by the aborigines as food. We have nothing to say about the properties of the plants except that the pseudo-bulbs seem rich in starch.

Grass—*Eremochloa bimaculata.*

G.S. (Toowong)—

The specimen has no seed head and it is rather difficult to name it from leaves only. The grass you sent we should say, however, is *Eremochloa bimaculata,* a species fairly common at this time of the year on dry, stony ridges where it provides a certain amount of fodder in such barren places. In addition to the stony country it also grows in sandy lands, such as Bribie Island and Maroochy River. Though comparatively common we have not heard a local name applied to it. If possible it would be as well for you to send a seed head to verify the determination.

Glycine Pea.

J.B.K. (Kilcoy)—

No. 1 is *Glycine tabacina,* the Glycine Pea or Glycine Vine. A very common legume in the general mixed native pasture in Queensland and usually regarded as a very good fodder. Though fairly common we have not heard a common name applied to it, and have adopted the generic name as the local one.

No. 2 is a species of *Desmodium* or Tick Trefoil. The specimen is not in flower but we should say it is *Desmodium triflorum,* a species fairly common in coastal Queensland extending to New Guinea and the Malayan region. Though a native plant it seems to have been on the increase during the last few years. We should say its presence would improve the general value of the pasture.

Barb Wire Grass.

J. H. McC. (Dalby)—

Your specimen is *Andropogon refractus,* commonly known as Barbed Wire Grass on account of the barbed wire-like appearance of the seeding spikelets. The grass grows mostly in fairly dry forest country and provides a certain amount of rather coarse forage.

DAIRYING.

Selected from the outward mail of the Supervisor of Dairying, Mr. Chas. McGrath.

Ropey Milk—Stringy or Curdled Milk.

C.J.C. (Montrose)—

Ropey milk is caused by bacteria which find their way into milk from various sources and are hard to eradicate. The specific micro-organisms consume the sugar of milk, using it to construct large slime capsules around their cells.

One of the sources is stagnant water, and cows which are allowed to wade therein often produce ropey milk. Should there be cause to suspect this source of infection the cows should be prevented from having access to the water, and their flanks and udders should be washed with a suitable disinfectant.

Some diseases of the udders of cows are a source of infection of the milk. Milk from cows suffering from any abnormal condition of the udder should not be used for human consumption. If there is any indication of udder derangement or ill-health of a cow a sample of the milk should be forwarded for bacteriological examination.

The organisms may be carried into the milk by use of unsterilised utensils, and the milk may in turn infect all other utensils with which it may come in contact. In such cases it will be necessary to sterilise all utensils in use including buckets, strainers, cans, separator parts, &c., by placing them in boiling water for at least ten minutes.

Should a milking machine be in use it will be necessary to thoroughly cleanse and scald each part and then sterilise by passing a suitable disinfectant through it. A suitable disinfectant for the above purpose may be made as follows:—

Stock Solution.—12 oz. chloride of lime in one gallon of water. Keep in a covered glass or stoneware jar until settled.

Solution for Use.—1 oz. of the above solution to three gallons of water.

PIG RAISING.

Replies selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.:—

Salt for Pigs. Lung Trouble.

R.J.R. (Monto)—

There is no danger associated with a reasonable use of salt in the feeding of pigs, but an oversupply would be very harmful in much the same way as would be the case if human beings were given an excess of salt in their food. A mixture of charcoal, ashes, salt, bone meal, and lime should be kept before the pigs at all times so that they can use same as they desire.

We would certainly not recommend the heavy dosing of pigs with medicine while they are suffering from lung troubles, but if you can induce them to take a mixture, such as one teaspoonful of turpentine with thirty drops of laudanum in a small quantity of food and then follow on with about two or three times the quantity of food without the mixture, good will result. Turpentine is a stimulant and would be effective in getting rid of internal parasites, worms, &c., for pneumonia is very often exaggerated by the presence of intestinal worms, especially in young pigs.

Pigs affected with worms cough a good deal, this being the result of internal irritation. Pigs are not usually condemned at the bacon factories for pneumonia provided the carcasses are otherwise normal, but badly affected animals in low condition would certainly not pass the inspector.

If you pay additional attention to the feeding of your pigs and keeping them under hygienic conditions, your future losses will be considerably lower.

Open Air Pig Breeding.

A beginner in the pig business asks the following question:—

Can pig-breeding be carried on profitably on the paddock system, using natural grasses as the food, perhaps with a little Sudan or Elephant grass given in during the summer time?

Answer.—No; pig-breeding cannot be carried on successfully on natural grasses. Pigs require ample supplies of succulent, nutritious food, and they must have some grain or concentrated meal in addition. Grasses and fodders such as Sudan grass, lucerne, sorghums, milo, clovers, maize, and Kaffir corn, pumpkins, wheat, oats, barley (as greenstuff), artichokes, and potatoes, all provide suitable green foods, and wheat, oats, barley, peas, maize and grain sorghums are all excellent grain foods. The best summer food is undoubtedly lucerne and clover, but you have a good variety among the crops mentioned to provide a good rotation of crops; these, with a light grain diet and ample supplies of clean cold water, should fill the bill.

Don't forget also that pigs need charcoal, wood ashes, and bone meal in the building up of the bony structure of their bodies, and in addition pigs should be given the opportunity of exercising freely over succulent pastures, where they pick up quite a lot of their living and benefit in the health-giving sunshine.

It certainly does pay to grow as much of the food as can be produced on the farm, and its utilisation right on the spot should be the objective. Concentrated foods used judiciously are a payable proposition too, and in many instances it could be shown that it pays a good deal better to purchase these concentrates than to attempt to grow them. As an instance it does not pay the pig farmer to attempt to grow wheat unless he is resident in a district where wheat can be profitably produced. Similarly there are many districts where it pays better to buy maize than to grow it, also peas, or the meals resultant from the grinding of these grains. Balanced rations should be fed in order to produce the most profitable returns, and these rations must combine all the elements necessary to produce flesh, fat, bone, heat, energy, and the store of fat for future use as required either before or after slaughter.

What is Tankage?

An inquirer of a scientific turn of mind who has been reading up the subject of feeding pigs stumbled across the term "tankage" in quite a lot of the references to protein foods and asks just what tankage is.

In general the term "tankage" is an American one, and indicates that the material referred to has been prepared from residues of meat trimmings and similar materials which, in process of manufacture, are placed in steam pressure tanks where a temperature of around 245 degrees F. is maintained for several hours. This high temperature releases most of the fats which are then drained off and sold under various trade names, after having been suitably prepared. The tankage is then dried to a point where it can be handled and stored for an indefinite period. After going through the drier the tankage is run through a mill (the dessicator) and from there to a grinder and screening machine, and is screened to a proper mechanical condition, in other words to the mechanical texture or degree of fineness of ordinary corn meal. It is usually sold under a guarantee of something like.

Crude protein	50 to 60 per cent. minimum
Moisture	7 to 8 per cent. minimum
Crude fat	8 to 10 per cent. minimum
Crude ash	5 to 10 per cent. minimum

In Australia most of this class of product is sold under the trade name of "Meat Meal" as stock foods regulations do not recognise a term such as tankage which does not indicate the origin of the product. Meat meal resembles tankage in appearance, but some grades carry a protein content lower than that referred to above. In fact the composition of quite a number of packing house or meatwork products varies in accordance with trade guarantees. It should be the regular practice of buyers of these products to study the chemical analyses which always accompanies the delivery per bag, for only in this way can satisfaction be assured.

In a good many instances meat and bone meal are combined and sold as such, and in others blood and bone are combined.

It is worthy of note in passing that under modern methods of manufacture there is no risk of the germs of disease being transmitted to live stock per the use of meat meals, as the products are thoroughly sterilised in treatment and rendered germ free and the high temperature to which they are subject effectively destroys any germs present. Government inspection does not permit any diseased animals or portions thereof being used in the preparation of meals for feeding to live stock, but even if such animals were used, all danger of transmitting these diseases would be overcome by the sterilising processes which this class of material undergoes.

TO NEW SUBSCRIBERS.

New subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some new subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and new subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

General Notes.

Staff Changes and Appointments.

Messrs. R. J. Rollston, J. Macfie, and H. Lambert have been appointed Assistant Inspecting Cane Testers for the forthcoming sugar season, with headquarters at Cairns, Mackay, and Bundaberg, respectively.

Mr. W. Benham, of Byrnestown, Gayndah Line, has been appointed an Honorary Inspector under the Diseases in Plants Act.

Mr. H. W. Chambers, of Westgrove Station, Injune, has been appointed an Officer under the Animals and Birds Acts.

Constable S. Renton, of Yaraka, has been appointed an Inspector of Slaughter-houses.

Mr. R. M. Macdonald, of 151 Miles 65 Chains, Southern and Western Railway, has been appointed an Acting Inspector of Stock.

Mr. K. V. Henderson, Junior Field Assistant, has been appointed Field Assistant, Cotton Section, Department of Agriculture and Stock.

The Officer in Charge of Police at Pomona has been appointed an Acting Inspector of Stock at that place. Mr. H. J. Walker has been appointed an Inspector of Slaughter-houses on probation.

Mr. W. Ellison, Sub-manager, Committee of Direction of Fruit Marketing, Brisbane, has been appointed an Honorary Inspector under the Diseases in Plants Act.

Mr. C. P. Power has been appointed a Temporary Ranger under the Animals and Birds Acts. Messrs. A. Nagle, N. E. Goodchild, R. E. Haseler, E. Widdup, and W. J. White, Officers of the Cotton Section, Department of Agriculture and Stock, have been appointed also Rangers under the Animals and Birds Acts.

The resignation of Mr. J. R. Collier as Inspector of Slaughterhouses, Cairns, has been accepted as from the 12th April, 1930, as tendered.

PIG SCHOOL AT GATTON—ALTERATION OF DATES.

The dates for the School of Instruction for Pig Raisers at the Agricultural College at Gatton chosen originally were 9th to 19th June, but it has now been found necessary, in order to fit in with College arrangements, to rearrange these dates, and those finally decided on are 30th June to 11th July, 1930.

Banana Planting.

The planting policy of the Banana Industry Protection Board for the coming season is based upon the opinion that under existing circumstances the complete eradication of "bunchy top" from the State is not practicable. In dealing with the disease, the aim should be to prevent its spread to those districts which are at present free from infection, and its reduction in areas already infested. In effect, permits for planting during the coming season in that part of Queensland outside the quarantine area declared between the Maroochy River and the main Caloundra-Landsborough road will be issued on the recommendation of the agent, with these restrictions:—No permit shall be issued to the occupier or owner of a neglected or abandoned plantation, nor for planting in proximity to a plantation badly infested with "bunchy top." Within the quarantine area defined as starting from the mouth of the Maroochy River on the north-east, and following the northern bank of the said river to its point of contact with the eastern boundary of State Forest Reserve No. 292; thence directly west to the boundary between the parishes of Maroochy and Kenilworth, following this boundary south to the township of Mapleton; thence continuing south along the main road to Montville; thence along such lastmentioned main road to the main Maleny-Landsborough road, following such lastmentioned main road to Landsborough; thence by the main road from Landsborough to Caloundra; and thence by the Pacific Ocean to the point of commencement, no permits for planting will be issued.

Queensland Wins Australian Cheese Championship.

The following principal awards in the Victorian butter and cheese competitions were announced on 21st May:—

BUTTER (FEDERAL CLASSES).

Australian Championship—

Grafton (New South Wales)	1
Upper Maffra (Victoria)	2
Maffra (Victoria)	3

Sheffield Shield (given by butter merchants of London)—

Bega (New South Wales)	1
Cobden (Victoria)	2
Maleny (Queensland)	3

CHEESE.

Australian Championship—

Cooranga North Dairying Co. (Queensland)	1
Downs Co-operative Co., Unity Brand (Qld.)	2
Moola (New South Wales)	3

World's Poultry Congress—Queensland Representation.

Mr. P. Rumball, Poultry Instructor, left by the "Largs Bay" for England on 20th May. Mr. Rumball has been granted five months' leave of absence by the Department for the purpose of enabling him to attend the Fourth World's Poultry Congress, to be held at the Crystal Palace, London, from 22nd to 30th July, 1930, and the post-Congress tour to be held in connection therewith.

The Department is not directly interested in Mr. Rumball's tour, and accordingly any business transactions which Mr. Rumball may engage upon while away from Queensland will be entirely between him and those who may entrust him with commissions.

The organisation of the Congress is being undertaken by the English Ministry of Agriculture and Fisheries, in conjunction with the Department of Agriculture, Scotland, and the Minister for Agriculture for Northern Ireland. There will be forty-five nations participating in the Congress, and it is expected there will be at least 4,000 delegates from Europe, North America, South America, Africa, Japan, and Australia.

At this Congress, there will be Sessions devoted to papers, an exhibition of poultry, poultry appliances, and the general methods of raising poultry and eggs in different parts of the world. It is anticipated that a special feature will be made of marketing. English will be the official language of the Congress.

After the Congress, the delegates will make a tour of Great Britain and Ireland. The English tours will be planned to show, first, the poultry education and research work conducted by the National Poultry Institute—namely, at Harper Adams Agricultural College, Shropshire, Cambridge University, South Eastern Agricultural College, Kent, Roseheath School of Agriculture, Cheshire, and the Government Veterinary Laboratory, Surrey, as well as the work of other eductional institutions.

In Scotland, visits will be made to the Genetics Department of Edinburgh University, the Rowett Research Institute, Aberdeen, the experimental farm of the North of Scotland College of Agriculture, and the official egg-laying test of the Department of Agriculture for Scotland. There will also be an inspection of commercial poultry farms and plants illustrative of Scottish poultry keeping.

In Ireland, visits will be made to the chief poultry centres, as well as to the Northern Island Poultry Research Station at Hillsborough.

Generally, the whole object of the Congress and subsequent tours is to bring together those concerned with the development of the poultry industry; pooling the best and most recent knowledge concerning the various aspects of the poultry industry in all parts of the world; improving and developing poultry research, education and economics; encouraging, through displays on an international basis of purebred poultry, the improvement of poultry stocks in all countries; and stimulating, through commercial exhibits, trade in all the requirements of the poultry industry.

The Congresses are held triennally, the first being held in Holland in 1921, the second in Spain in 1924, and the third in Canada in 1927, and the fourth in London in 1930.

Australian Thrift.

The Australian life insurance companies, according to last year's official figures, have funds totalling £180,000,000, and have entered into contracts to pay to widows and orphans no less than £320,000,000, on behalf of some 2,000,000 policy-holders. With the added assurance from reversionary bonuses the total to be paid under the abovementioned contracts will exceed £400,000,000 to be paid to people at a time of greatest stress. If one unites with this evidence of Australian thrift the actual savings in the savings banks, which total £216,000,000, and the fact that 60 per cent. of Australian householders are on the way to owning or actually do own their own homes, the stability of the national character of our people is apparent.

Radio Lectures on Rural Topics.

Following is the June list of radio lectures arranged for officers of the Department of Agriculture and Stock, Station 4QG., Australian Broadcasting Company, Limited:—

Monday, 9th June—"Educational Particulars for the Pig Farmer." Mr. L. A. Downey (Instructor in Pig Raising).

Wednesday, 11th June—"Country Topics." Mr. J. F. F. Reid.

Monday, 16th June—"Talk on Dairying." Mr. C. McGrath.

Thursday, 19th June—"Talk on Fruit Culture." Mr. L. J. Freeman.

Monday, 23rd June—"Housing of the Pig." Mr. L. A. Downey (Instructor in Pig Raising).

Thursday, 26th June—"Country Topics." Mr. J. F. F. Reid.

Thursday, 3rd July—"Talk on Sheep and Wool." Arranged by the Department of Agriculture and Stock.

Cheese Board.

An Order in Council has been passed amending the constitution of the Cheese Board. The amendment applies only to the constitution of the Board itself. The amended constitution provides:—

(*a*) That the Cheese Board shall consist of five (5) members elected by growers, together with the Director of Marketing or a Deputy appointed by the Minister.

(*b*) For the purposes of the election Queensland is divided into five districts, with one representative for each division; the electors of each division shall be: (1) Cheese Manufacturers in that division who produce or produced cheese for sale during six (6) months prior to the election, and (2) dairy farmers who during six months prior to the date of election supplied or supply milk to cheese manufacturers operating in that division.

The cheese factories in each division are as follows:—

Division No. 1.—Cooranga North, Daredale, Koondaii, Highgrove, Maclagan (Kulpi), Maclagan, Maclagan North, Rangemore, Yamsion, Malling, Moola, Quinalow, Rosalie, Rosemount, Sunnyvale, and Woodleigh Cheese Factories.

Division No. 2.—Biddeston, Boodua, Gowrie Junction, Hodgson Vale, Jondaryan, Lilyvale, Westbrook, Wyreema, Crosshill, Kelvinhaugh, Kingsthorpe, Wellcamp, and Barnesmore Cheese Factories, and C. M. Hitchcock, Gomorran.

Division No. 3.—Aubigny, Captain's Mountain, Irongate, Kooroongarra, Mount Tyson, Brookstead, Linthorpe, Pittsworth, Scrubby Mountain, Springside, Yarranlea, Rocky Creek, and Yargullen Cheese Factories.

Division No. 4.—Mount Sibley, Felton, Greenmount, East Greenmount, Mount Sibley (Ascot), Ramsay, Southbrook, Bony Mountain, Elbow Valley, Greymare, Lord John Swamp, Pratten, Talgai, and Victoria Hill Cheese Factories.

Division No. 5.—Braehead (Peeramon), Coalstoun Lakes, Dundarrah, Glen Allyn (Malanda), Silvermist (Malanda), Cheese Factories, and the Queensland Agricultural High School and College, Gatton.

Nominations will be received by the Returning Officer, Department of Agriculture and Stock, Brisbane, until 5 p.m. on the 25th June, 1930, for election as growers' representatives on the Cheese Board.

Five such representatives are to be elected by the growers, as defined in the Order in Council dated the 22nd May, 1930, as mentioned above.

Each nomination is to be signed by at least ten growers as above, in the division concerned, in accordance with the Order. The elected representatives will hold office for the period from 1st August, 1930, to 31st July, 1933.

Dairying at Mackay.

Thus “W.M.” in the “Live Stock Bulletin:—

In previous issues we have referred to the progress being made with the development of dairying at Mackay, Queensland. On the 1st March last, Mackay's butter factory began operations and although the people of the sugar centre were inclined to doubt the success of the venture, the first day's operations brought forth thirty-eight suppliers with a total of 1,269 lb. of cream, which produced 637 lb. of first-grade butter. Progress right through the month has been steady, the figures for the first three weeks of March being 4,255 lb., 3,951 lb., and 4,001 lb., the corresponding output of butter being 2,237 lb., 2,077 lb., and 2,070 lb. It will thus be seen that the average weekly output of first-grade butter for the first months of the factory's history was a little less than a ton. As the consumption of butter in Mackay and district is approximately 7 tons a week, the factory has an “open go” to reach and overtake this local consumption.

The quality of the butter is of the best, and is in demand by merchants and the general public. In addition, the whole district is very enthusiastic over the factory, and dairying is making great strides.

Cattle of the best quality are being brought to the district, and generally speaking, the Mackay district is just about in the midst of a dairying boom. Lands that would not previously be looked at are now coming into demand for dairying, and agitation on behalf of the people is having the effect of new scrub lands being opened up in various parts of the district for dairying.

Litter Records that will Stand Competition.

Advice recently to hand from America indicates that while G. F. Volle, of Knox County, Indiana, backslid a bit by crossing other blood with his Hampshire pigs, he did make a remarkable production record—8,080 lb. of pork produced from four litters in six months. One litter of ten pulled down the beam at 2,310 lb., one of eleven weighed 2,174 lb., another of eleven 2,122 lb., and the other with only seven 1,484 lb. These pigs were raised in strict accordance with the McLean County System of Sanitation on a balanced ration. One of the most interesting features of the accomplishment is the fact that Mr. Volle only had four sows on his farm.

These records are spoken of as indicating the superior quality of the Hampshire breed, a white-belted American pig that has not yet been introduced into Australia. It is also stated that the Hampshire characteristics, as is customary in all crosses of this nature, are strikingly evident in all of his pigs. The records will be hard to beat.

A.I.F. Reunion Committees.

The secretary of the United Council of Queensland A.I.F. Units advises that the magnificent response of ex-members of the A.I.F. to the appeals of the reunion committee, asking them to join in the march on Anzac Day was most gratifying. A further appeal is, therefore, made to returned men to assist their committee in keeping them in touch one with another. This help may be afforded by every Digger belonging to a unit that has formed a committee, communicating with the hon. secretary of that association, giving his name and address. This will assist in compiling and keeping the nominal roll up to date. The names and addresses of the hon. secretaries of reunion committees are as follow:—Artillery, H. J. Watkins, Kellett street, Auchenflower; 2nd Light Horse, J. Holliday, Anzac Club, Elizabeth street; 5th Light Horse, R. S. James, care Masonic Club, Creek street; 9th Battalion, J. D. Allan, care Lands Department, Brisbane; 15th Battalion, J. Churchill, care Trittons Limited, George street; 25th Battalion, W. Prentice, care Repatriation Department, Brisbane; 26th Battalion, R. Daniels, care Overells Limited, Valley; 31st Battalion, A. Mirls, 146 Queen street; 41st Battalion, V. Smallwood, care Repatriation Department, Brisbane; 42nd Battalion, G. J. Angell, Box 1503V, G.P.O., Brisbane; 47th Battalion, B. J. Platt, care Overells Limited, Valley; 5th Motor Transport, I. Cooper, care Anzac Club, Elizabeth street; 7th Field Ambulance, care Bernie Harris, Harris and Sons, jewellers, Edward street, City. There are still many Diggers who served with units that have at present no organisation catering for their welfare. Every possible assistance towards establishing committees among the following Queensland A.I.F. units:—Flying Corps, Engineers, Pioneers, Army Medical Corps, Army Service Corps, 49th and 52nd Battalions, will be given by the United Council of Queensland A.I.F. Units. Communications should be sent to the hon. secretary, Mr. Viv. Brahms, Box 1503V, G.P.O., Brisbane.

Milking Persistency.

It will be generally agreed that the value of a dairy cow depends upon her ability, not merely to produce a heavy milk yield, but to maintain high productivity over a period of years, and to combine this with a generous output of butter fat A list has just been compiled by the English Guernsey Cattle Society, which gives wonderful proof of the milking persistency of the Guernsey cow. Forty-five cows appear in this new list of merit.

They have all of them gained five, six, or seven certificates under the Society's Advanced Register scheme, which has only been in full operation since 1919, and thus all of these cows have completed five or more lactations of exceptionally heavy yields, both of milk and butter. The overall average for the forty-five cows and their combined total of 243 lactations is approximately 1,000 gallons of milk of over 5 per cent. butter fat. This, of course, only includes pedigree cows which are actually being tested for butter fat by the society.

Among the cows so listed is Trengwainton Sweet Briar 2nd, the property of Colonel E. H. W. Bolitho, with a yield of 76,208 lb. of milk and 3,702.68 lb. butter fat in seven lactations; Chorleywood Programme 3rd, in Mr. E. Gerrish's herd, near Land's End, in Cornwall, with a total yield of 66,065 lb. milk and 2,976 lb. butter fat in six lactations; and Juno of Echelle, a cow in Lord Poltimore's herd, with a yield of 69,235¾ lb. of milk and 3,884 lb. butter fat in seven lactations; Downe Fleur of Vimiera, in Mr. Walter Dunkels' herd, has given 67,543 lb. of milk and 3,530 lb. butter fat in seven lactations.

The yield of Tregye Maze (the famous 2,000-gallon Guernsey cow) for five lactations is 61,137¼ lb. milk and 3,217.46 lb. butter fat, with an average butter fat percentage of 5.26.

The Value of Grass

At one time farmers simply looked on grass as a cheap food that was provided for their benefit by Nature, and not a crop that needed manuring or care of any sort. To-day, thanks to science, such men are better informed, and know that as with arable land so with pasture, they cannot expect the best returns unless they put something there. Grass is, after all, practically the basis of all life, and it is to be looked upon as one of the most valuable foods for all kinds of live stock, not excepting the pig. Therefore, no efforts should be spared to get a good crop, one that will provide an early bite, and also last long into the autumn. Carefully-planned systems of manuring and grazing will help this object to its desired end, but haphazard use of the pastures will only rob them of nourishing verdure. It is not every farm, especially those on the hills, that is well equipped with grass land, and thus it is up to the farmer to do the best he can to aid Nature in the provision of this natural food.—''Live Stock Journal'' (England).

Marketing of Strawberries.

Regulation 188 under the Primary Producers' Organisation and Marketing Acts has been approved. This regulation provides for the conducting of a poll to decide whether an Order in Council shall be made declaring that strawberries grown in Queensland shall be acquired by the Committee of Direction as the owners thereof. The proposed Order in Council will apply to all strawberries grown in Queensland for canning purposes or for sale on a wholesale basis during a period of one year from 15th May, 1930—that is, to 14th May, 1931. The ballot is to be conducted by the Committee of Direction. Growers entitled to vote at such poll will be growers of strawberries in the State of Queensland who declare they expect to have strawberries for sale on a wholesale basis during the above period of one year. The roll of persons eligible to vote shall be compiled by the Committee of Direction from their records, and other sources of information. To insure their names being on the roll, persons eligible to vote are invited to send their names and addresses at once to ''The Committee of Direction of Fruit Marketing, Turbot street, Brisbane.''

Queensland Pastoral Supplies, Limited—Buyers' Guide.

The most satisfactory feature of this catalogue, which has just come to hand, is the impression gained that the company's motto—''Service before Self''—has been the basic maxim in all its operations. Numerous letters from buyers, which are scattered throughout its pages, attest to this fact, and you can scarcely open a page without alighting upon some maxim, philosophic truth or similar interesting matter, which relieves its contents of any sense of monotony. In the grocery and housekeeping departments various recipes are given for using the particular line referred to. It is a condition of purchase with this firm that its prices are understood never to be higher than any other wholesale house—otherwise a buyer has the right to deduct the difference.

Flies Transmit Swine Fever.

Recent American advices inform us that hog cholera (here called swine fever) is not, as commonly supposed, carried so much by man or pigeons as it is by both barn and house flies.

This finding is the result of ten years of investigational work chiefly in Iowa (United States of America). By liberating flies that were coloured for later identification, it was learned that they had travelled as far as 13 miles, going 6 miles in twenty-four hours. House flies followed a team 2 miles. According to Dr. C. N. McBride, of the United States Bureau of Animal Industry, if more of the Western farmers in the United States would bale as much straw as was needed and burn the rest of it, they would be doing a wise thing as far as swine fever is concerned. Wet straw and manure piles make ideal breeding places for stable flies and should be spread on the fields with a manure spreader (or be ploughed in as soon as possible) rather than be allowed to accumulate around the barns or feed yards. This is good advice that should be carefully noted by every farmer.

The Goal.

Three things to govern: Temper, tongue, and conduct.
Three things to cultivate: Courage, affection, and gentleness.
Three things to commend: Thrift, industry, and promptness.
Three things to despise: Cruelty, arrogance, and ingratitude.
Three things to wish for: Health, friends, and contentment.
Three things to admire: Dignity, gracefulness, and intellectual power.
Three things to give: Alms to the needy, comfort to the sad, appreciation to the worthy.

Points in Dairy Practice.

Feed regularly and plentifully. In addition to pastures, grow fodder crops, if possible, all the year round. Grow lucerne, if possible, if only a quarter of an acre. During the autumn plant oats, vetches, wheat, barley, &c., and during the spring and summer grow maize, sorghum, saccaline, Sudan grass, &c. In addition, give the cows a little concentrated food, such as crushed oats, maize meal, bran (each two parts), mixed with lucerne chaff (eight parts).

Improve your pastures by top-dressing and the sowing of winter grasses and clovers. The pasture on land which has been used for dairying for a long period without any effort being made to return to the soil the mineral constituents which have been taken from it becomes deficient in such ingredients, and the animals that graze on it suffer. In some dairying districts there is need for a change of food from paspalum, which in districts where frosts are experienced produces little or no nourishing material in the winter. Better pastures mean healthier and more consistently productive cattle.

Divide your farm, if possible, into small sections—say, of 10 acres each—and graze them off in rotation. Thus the cows have fresh young pasture all the time, and their milk yields are increased.

A lick should be provided on most dairy farms. A suitable one for most conditions is forty parts Liverpool salt, ten to twenty parts bonemeal, and one part sulphate of iron.

Profit by the security afforded by a reserve of feed in the form of silage. The most convenient form of silo for the dairy farmer is the overhead type; but a stack is cheaply constructed, and where the soil is suitable a pit silo can be used. Silage is a good insurance against times of scarcity; it does not burn or deteriorate, and cows milk well on it.

If there is an experiment plot in your district, watch the trials and learn from its successes and failures.

Join, if possible, a herd-recording unit; it is the cheapest and most effective way of getting at the yields of your cows. Put a pure-bred bull of known and recorded production strain at the head of the held, keep his heifers out of the highest-yielding cows, and as soon as they come in cull out and sell to the butcher the low producers. It is wonderful how quickly the average yield of the herd goes up if it is managed on these lines.

Feeding well is the basis of everything in dairying. Testing the cows is only the means of finding out if they respond to the food given them; some respond, others do not—that is the difference between the profitable and unprofitable individuals. Under the present economic conditions only the best should find a place in the milking-yard.

The Art of Flying.

"Many people have an erroneous idea about flying. Some think it is a romantic undertaking or a suitable outlet for recklessness," said Mr. L. J. Brain, A.F.C. (Brisbane manager of Qantas Ltd.), when delivering an instructive address on the "Art of Flying" to members of the Queensland section of the Australian Aero. Club, at Empire Chambers, last night. The art of flying was essentially an exact science, continued Mr. Brain. As a modern means of transport it was already playing an important part in the community, and would play an even greater part in the future. Aviation could in no way be regarded as a "show" business. The two essential qualifications for the beginner were that he should be young and mentally alert. The best type was a quick thinker, but cautious, without discarding the normal ideas of what constituted safety or foresight. Mr. Brain then detailed the progressive steps of a beginner to the last stages where he was capable and competent for his pilot's ticket. He strongly advised members against flying in adverse conditions. Statistics showed that even with the most experienced pilots the greatest percentage of accidents was due to flying "blind."

District Canegrowers' Executives.

Regulations under "*The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1928," relating to the election of Chairmen and the powers of Chairmen of District Executives, have been approved. The Regulations are numbered from 239 to 245, and deal mainly with the mode of election of a Chairman. Briefly, they provide as follows:—

(*a*) That every District Executive shall, within a reasonable time after the declaration of the poll, meet to elect one member to be Chairman.

(*b*) That at the election the Secretary or Acting Secretary shall preside, but shall not exercise either a primary or casting vote.

(*c*) The person declared to be elected must have received a majority of the votes cast by all elected members.

(*d*) If no member obtains a majority of votes, the Secretary shall convene a special meeting to elect the Chairman.

(*e*) Such meeting shall consist of three representatives from each Mill Suppliers' Committee in the district represented by the District Executive and the elected members of the Executive, provided that an elected member of the Executive shall not act or vote as a representative of a Mill Suppliers' Committee as well as an elected member of the Executive.

(*f*) At such special meeting the Secretary or Acting Secretary of the Executive shall preside, but shall not exercise a vote.

(*g*) The Chairman of a District Executive shall have both a primary and a casting vote.

Winter Work in the Vineyard.

Viticulturists may be reminded of the importance of making an early start with the winter ploughing.

All the operations pertaining to the working of a vineyard throughout the summer have a tendency towards the consolidation of the soil immediately below the surface. This is accentuated by early autumn rains, and by the growth of weeds incidental to such rains. In such a condition, accumulated water is quickly shed from the surface, and more particularly so if the land has any appreciable fall. Winter cultivation aims at enabling the land to absorb moisture and preventing "run-off," and a broken, loose condition is therefore produced. Naturally, the rougher and more open the surface, the more easily does the water find lodgment, and the more certainly reach the subsoil. In the early winter cultivation, destruction of weeds is purely secondary, although it is very largely effected.

Under normal circumstances, the earlier the winter ploughing can be started the better. Where small areas are concerned it is a simple matter, but with large vineyards the work has to be started early in order that it may be completed in good time. The nature of the soil has to be considered, and the ploughing so arranged that the most difficult portions are completed first. Heavy soils should, in most cases, be completed before they become too wet, while lighter ones may safely be left until later, as they may be ploughed at almost any time.

The system of ploughing varies in different districts and according to local custom, but it should be accepted as an axiom that the lower the average rainfall the greater the care that should be put into cultivation. Efficient work aims at complete turning of every portion of the surface at least twice a year.

The system generally recommended is as follows:—So soon as the land is in a fit condition for ploughing, plough to a depth of 6 inches away from the vines, throwing the soil towards the centre of the row, keeping the crown as low as possible, and turning subsequent furrows over, until vines are reached upon either side. The strip of soil left unploughed underneath the crown will be worked during the second ploughing. It is not always advisable to plough deeply right up to the vines, owing to the possibility of severing important roots, or even pulling the vine out of position. It is preferable to turn the last furrows with a lighter finishing plough. Implements are obtainable that are so constructed that the body is set over from the beam, which is at the same time movable, and can be set right out to allow the horse to walk wide of the row. In this way there is very little left unploughed—simply a small strip against the vines, which is easily treated by means of a hoe.

For the ploughing of large areas ploughs can be procured up to size of four furrows, and which can be adjusted for finishing off close to the vines, and again readjusted for the second or throwing-on ploughing, thereby doing away with single-furrow work. The hoeing operation may be accomplished by hand, or by a specially-constructed implement known as the "vine hoe," which carries a hoe or blade out upon an arm so that when guided by the steering disc on the near side, it can be worked around the stems of the vines with ease, turning one-half of the unploughed strip on either side. When the whole work has been completed the soil is high in the middle of the rows, while the vines stand in the depression, and are therefore more likely to get the benefit of any rain that falls. The uneven and rough surface meets, in an ideal manner, the requirements mentioned above.

The soil is permitted to remain in this condition throughout the winter, and harrowed prior to the second ploughing to facilitate the operation, and left until such a time as it may be desirable to push on with the further cultivation. Pruning and other work will be completed in the meantime.—A. and P. Notes, New South Wales Department of Agriculture.

Points in Bacon Curing.

1. Use judgment in selecting the pig, which should be about 150 lb. live weight. Select perfectly healthy pigs, free from bruises, cuts, sunscald, &c. Sows passing through the oestral period should be held for at least ten days, otherwise good-keeping meat will not result.

2. Before slaughtering let the animal fast for eighteen to twenty-four hours, keep it quiet, and allow plenty of clean drinking water.

3. Never kill an animal which is losing weight, or which has become overheated just before killing time.

4. Kill animals by sticking to ensure thorough bleeding.

5. Exercise care in scalding, and see that the carcass is cleaned thoroughly and that no hair is left thereon.

6. Adopt convenient cutting to give efficient drying. (A good method is to divide the side into shoulder, middle, and ham.)

7. Release joint oil from cavities of joints in both shoulders and hams.

8. Have the tables and the room in which the curing is to be conducted scrupulously clean.

Dalby Show.

It can be said with safety that the dairy cattle section at the recent Dalby Show was one of the factors which did a good deal to making the event the success that it was. The dairy cattle section was an excellent one. The quality of the Jerseys and I.M.S. was all that could be desired, while the Jerseys had some outstanding animals amongst them. The display of pigs was the best ever seen at Dalby, Duroc-Jerseys, Berkshires, and Tamworths being the three breeds shown.

Mr. W. Middleton, Wyreema, Queensland, judged the cattle section, and made the following awards:—

Champion Jersey bull, Mr. D. R. Hutton's Bellefaire Blondes Bellringer. Champion Jersey cow, the same owner's Trecarne Rose II. Champion I.M.S. bull, F. G. Lamkin's Fuschia's Monarch. Reserve Champion, I.M.S. bull, P. J. Skernan's College Molly's Prince. Champion I.M.S. cow, W. F. Kajewski's Cherry VI. of Burradale, with the same owner's Rainbow VI. of Upton reserve champion cow. The Ayrshire class for cow 3 years old and over was won by Mr. R. C. Drew's Shudley Model.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

MILK.

OF all foods milk is the most necessary, the most easily contaminated, and the most perishable. Without good milk children cannot be healthy, and babies cannot live. Cow's milk should seldom be necessary for the young infant, but after weaning it is indispensable. No other food is so important for the public health.

Neutralising Contamination.

Milk as it comes from the cow is almost free from germs, but it soon becomes contaminated by all sorts of bacteria. Some of this contamination is unavoidable. Much of it comes from dirt on the cow's udder and flanks, the milker's hands, and the air of the cowshed. Stray hairs, flies, and fragments of cow food or cow manure drop into the milkpail or are blown into it, and all of these contain bacteria. Worse than all these are the myriads of bacteria contained in unsterilised milkcans. Washing with boiling water is an imperfect method of sterilisation, for the water is not boiling when it gets into the cans, and its contact with their interior is too short. Efficient steam sterilisers are not available except in factories. For these reasons much milk is dirty at the start, and most milk is doubtfully clean.

If milk is fairly clean to begin with it does not keep clean for more than a few hours at ordinary temperatures, for the bacteria that have been introduced grow with extreme rapidity. Fortunately there is an interval during which the bacteria do not increase in number in fresh clean milk. At 50 deg. Fahr. such milk will remain fresh and clean for twenty-four hours, at 60 deg. for twelve hours, at 70 deg. for six hours. At the end of this period it deteriorates rapidly. Unfortunately, milk which is dirty from the first deteriorates much earlier.

If, therefore, at temperatures of over 70 deg. we wish to keep milk for twelve hours or more, there are only two alternatives. Either the milk must be kept constantly chilled to below 50 deg. or the milk must be heated. The most simple method is to bring the milk to boiling point (212 deg.) and then cool it. Boiling destroys all but a few of the contained bacteria, but these will grow, and boiled milk is not safe for more than twelve hours at summer temperatures. Another method is pasteurisation, which is the heating of the milk to a lower temperature (145 deg.) and keeping it at that temperature for thirty minutes. After pasteurisation it should be put into sealed sterilised bottles and kept chilled until delivery.

How Epidemics may be Caused.

Occasionally milk becomes contamined by disease germs, either derived from the cow (for instance, those of tuberculosis) or from the milkers or those who handle the milk (for instance, those of typhoid, scarlet fever, and diphtheria). Such contaminations not only cause disease; they have frequently caused epidemics. Against this danger the only perfect safeguard is boiling or pasteurisation. By our domestic habit of boiling milk we in Queensland are saved from much disease which in States with shorter summers results from the unclean habit of drinking raw milk.

Dried Milk.

Of late years dried milk has come into use and is much advertised. It has unquestionably been of much value where clean fresh milk has been unprocurable. Many babies have thrived on it, but, unfortunately, many others have failed to thrive. Like other tinned foods, we have found it sometimes a useful substitute, but inferior to good fresh milk. It is also, of course, more expensive.

Science Serves the Consumer.

When Brisbane was a small town there was no great difficulty in the milk supply. As it grew into a large city, and the milk suppliers were driven further and further out, much of our milk became very inferior and unsafe for babies. Fortunately, sound and scientific methods have of late provided us with a trustworthy supply of chilled pasteurised milk in sealed bottles. It is thus ensured against contamination by dust and road sweepings while being distributed. Kept on ice it is safe for twenty-four hours. If not iced it is safe for twelve hours; if kept longer it should be scalded at the end of that time. For nearly three years this milk supplied by the Metropolitan Milk Supply Company has been used by the Baby Clinics and Creches in this city, and we have found it safe and wholesome.

It is much to be regretted that there are other towns in Queensland which need, but have not, an equally good milk supply.

WINTER DANGERS.

A baby may suffer from diarrhœa—that is to say from loose and frequent motions—caused by improper feeding at any time of year, but cases of severe diarrhœa are much less common during the winter months. In particular the epidemics of infectious diarrhœa or dysentery do not occur during the cool weather. On the other hand, a number of infections causing coughs and colds, which may occur at any time of the year, are more common and more serious during the winter. Although winter in Queensland should be a healthy season, many unnecessary deaths of infants and young children from bronchitis and pneumonia may be expected at this time. We should have fewer deaths if mothers only knew that these diseases follow infection. There are a large number of disease organisms which attack the nose and throat, sometimes spreading into the ears and lungs. Among them, to mention only a few, are those which cause influenza, measles, and whooping cough.

The Common Cold.

By far the most common infection of the air passages is that known as a "common cold." Baby has a running nose, a cough, and is feverish for a day or two. His mother says he has caught a chill, and does not know she is talking nonsense. These "colds" are infectious diseases spread from person to person. Though usually mild diseases, they are the most common causes of abscesses of the ear, bronchitis, and pneumonia. If mothers would try to protect their infants from infection we should have fewer deaths. "Colds" are more common in winter, because then people stay more indoors with closed doors and windows, so that living germs spread more easily from one to another, and at this season many people are carrying these germs about. If you allow anyone who comes into your house to fondle or kiss your baby, his chances of catching a "cold" are very many. Or one of the older children gets the infection at school, which you cannot help, comes home, and straightway gives it to the baby, which you can and should prevent. Do not get a "cold" yourself, for then it is difficult to avoid infecting your babe, though you should try. We have seen a woman forcing infection into a baby by putting a dummy into her own mouth and then into the baby's mouth. This is horrible.

The Baby at the Picture Show.

But infection spreads in other ways. Whenever anyone coughs or sneezes he sprays his germs into the surrounding air to be breathed in by other people. Of course, he should smother his cough with a handkerchief, but he often does not. Even loud talking will spray germs about. This is how crowds of people in closed halls, such as picture shows, become infected easily and rapidly. If you take your babies to these places you are either very careless of their health or know little how to preserve it.

Plenty of Fresh Air for the Young Australian.

You can do very much to protect your young children from these infections, but you cannot always be successful. Therefore keep them strong and healthy so that they may throw off infection as easily as possible. Do not keep them shut up indoors; this lowers their strength and increases the risk of infection. See that they always have plenty of fresh air to breathe, especially at night. Clothe them sensibly according to the weather, but do not overclothe, for this weakens their resistance. Keep them strong and healthy by proper feeding. Bottle-fed babies and poorly-nourished children stand the worse chance.

The Safest Thing to Do.

The chilliness that comes before a ''cold'' is not the cause of the ''cold''; it is the beginning of the ''cold.'' The safest thing to do with a child who has a ''cold'' is to put it to bed till it is better. Certainly it should be kept in bed as long as it is feverish and a day longer. It will be thirsty, so let it have plenty of water or fruit juice, and water. It will not be hungry, so never force food on it. This rule applies also to young babies who should have more water and less milk until the trouble is over.

If the mothers of Queensland will take the advice here given, we shall pass through this winter with fewer deaths.

HOW TO COOK A HAM.

''Too many cooks spoil the broth,'' but one cook is often quite enough to spoil the meat! Like the bad workman, who blames his tools, the bad cook is ever ready to declare that the shortcomings of the joint when it comes to table are to be looked for in the meat itself rather than in the method of preparing it. And if there is one joint more than another that requires careful preparation and careful cooking, it is a ham. There are good hams and bad hams, but how many of the former have been entirely ruined by an unskilful or careless cook! An all-important matter in regard to a ham is the length of time given to soaking it beforehand. A mild ham may not require more than twelve hours, but one that is strongly salted may want twenty-four or even thirty-six hours. By looking at it one can often tell how it has been cured, or by putting a skewer into it and applying the tip of the latter to the tongue, one can judge whether the ham be over-salt or not. In any case, it is well to err on the liberal side when soaking. After the ham has been sufficiently soaked, it should be scraped quite clean and dried with a clean cloth. Then it is put into cold water in a cauldron large enough to allow for swelling, and brought very gently to the boil. After that it should be allowed to simmer slowly until it is cooked. The time to be allowed for simmering is thirty minutes for every pound it weighs in the case of a large ham of, say 12 lb. or over. For a smaller one rather less may suffice. It may be tested with a skewer, which will go in and come out clean and readily if the cooking is complete. The ham should then be set aside to cool in its liquor, after the skin has been removed.

KITCHEN GARDEN.

Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. In fine weather get the ground ploughed or dug, and let it lie in the rough until required. If harrowed and pulverised before that time, the soil is deprived of the sweetening influences of the sun, rain, air, and frost. When the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

Rhubarb.

The continued production of rhubarb may be greatly assisted by giving a heavy mulching of manure and hoeing it well into the soil. Keep the beds well watered, and give regularly a dressing of liquid manure, say, once a week.

It is not necessary to use forcing manures on the young stock, as plants are ruined if forced in the early stages of growth.

The rhubarb makes rapid growth during the autumn and spring, and when stalk cutting has been started liquid manuring and manuring may be given.

Lettuce Culture.

A thin sowing of lettuce seed where the plants are to mature insures not only an earlier crop, but it will be found that the plants grown in this manner are far less likely to run to seed than others transplanted from over-crowded seed-beds.

Lettuce resents checks in all stages of growth, and through inattention in the early stages many losses occur through early seeding. An undisturbed plant may be relied upon to give a good head at least a fortnight or more in advance of others, and for this reason alone it is worth while taking a little extra care in preparing the bed and sowing the seed.

A liberal dressing of manure is always beneficial to this crop, for, in addition to the food value, it retains moisture and keeps the roots cool during the hottest weather. Cow manure is the best, but whatever manure is used should be buried 9 in. below the surface. If it is put in deeper than this the roots will not reach it until the plant is well developed, and therefore unable to take full advantage of the food provided. Unlike many more delicate plants, the roots of lettuce will penetrate rank manure even when quite small, and grow very rapidly. Sow lettuce seeds in drills running from north to south. Draw them out with a blunt stick deep enough to allow a scattering of finely-sifted soil being placed in the bottom, and the seed being covered 1 in. deep. This will ensure an early and very even germination. When the seedlings are about 1 in. high, thin out to one plant to every 6 in. of the row. Frequent stirrings of the soil and an occasional dusting of soot will induce rapid growth, and if, when the plants are half-grown, the surface of the bed is given a dressing of either nitrate of soda or sulphate of ammonia, at the rate of ½ oz. to each yard of row, and lightly forked into the ground, and afterwards well watered in through a fine-rosed can, the plants will readily respond. Good results will follow an application of liquid manure or even soot water.

ROSES.

From the Pacific Nurseries, Wondall road, Manly, Queensland (Messrs. C. W. and A. C. Heers) comes to us their 1930 Rose Catalogue, an excellent little booklet that should be in the hands of every rose grower. The nurseries are easily accessible from the city and are open to all for inspection.

The following useful working notes are culled from this valuable catalogue:—

Time for Planting.—From June until the end of September. For the coastal, excepting perhaps the far North, we specially recommend the later period, and, in support, advance the following reasons:—

(1) Every horticulturist must admit that all roses invariably exhibit luxurious and succulent growth and wealth of bloom during the months of March, April, May, and early June. This being so, we contend that as the plants are full of flowing sap they not in a fit condition for transplanting during that period.

(2) Roses planted during the earlier months readily respond to the warm periods which assuredly occur in the middle of our winter, only to be as surely struck by our colder and more frosty days during the latter part of the winter. This shock not only checks the growth, but actually kills the tender white jelly-like roots then in the forming. There can be only one result—a plant with stunted growth upon which the foundation of your future tree has to be built. Remember, if these plants are left undisturbed in the nursery they remain dormant.

(3) On the other hand a thoroughly rested and ripened plant, transplanted during late July, August, or September, according to the trend of the season, is ready to break away into full and vigorous growth as the warmth of Spring appears, never to look back.

We readily admit that the rose, being a hardy plant, may even do well when planted early, but after much experience we prefer to pin our faith to late planting in most parts of Queensland where our winter is so variable. Holding these views, we hope clients will not ask us to send roses out earlier than June, although we much prefer, whenever convenient, that you follow our advice and plant later in the season, say, from the middle of July to the middle of September.

It is gratifying to us to know that quite a number of clients after acting upon our advice, write to say how pleased they are with their experience of late planting; so we reiterate—do not plant or prune roses too early in Queensland, especially along eastern slopes.

Roses should never be planted when the ground is sodden as the soil glues together and excludes the air so necessary for the future welfare of the plant. Rather delay planting, and in the meantime bury the whole plant lengthwise, cover completely with soil and await more favourable conditions.

Although Roses do well under almost any condition, it will always repay you to trench and drain the ground. However, should the ground be flat and unsuitable for drainage, it is better to dig it a foot deep and raise the bed. Such beds require hardwood or concrete borders, otherwise the outside plants dry out too easily. Work in a liberal supply of well-rotted cow or stable manure. This work should be done at least four weeks prior to planting. Plant so that the union will be just under the surface of the ground. In the case of light, sandy soils it is an advantage to have the union as much as two inches below the surface. Never on any account place fresh manures or any form of fertiliser near the roots at the time of planting.

The roots should be evenly spread and so arranged as to give them a downward tendency; cover with about three inches of fine soil and press down firmly; fill in and give a liberal supply of clean water. Keep the earth away from the graft until the plant strikes; in the meantime mulch with straw in order to protect union and keep the soil from caking.

The mulch also creates an ideal condition for further waterings. Should the weather continue dry, it will be necessary to water at intervals according to the conditions. Do not use fresh manure or artificial fertiliser near the roots when planting. Should the sun's rays become hot after planting, it is advisable to provide the plant with artificial shade.

Suckers.—Always keep a sharp lookout for brier suckers, which may from time to time sprout from below the graft. These are readily detected by their foliage, and if not removed they will in time kill the rose tree.

Manuring.—Roses should be heavily manured at least once a year, well-rotted animal manure being the best. It should be spread over the bed and lightly forked in. Bone dust and other suitable fertilisers are also beneficial. Established rose trees are greedy feeders, and periodical light dressings of fertiliser, applied during damp weather, give good results. Heavy soils need occasional dressings of lime, which, however, should not be used within a month or so of fertilisers.

Pruning.—There is no phase of rose culture more difficult to impart than that of pruning. After accepting the broad principles generally laid down, make a close study of the habits and peculiarities of the various types of roses. Apply common sense methods and observe and profit by the results obtained. We are opposed to early pruning in this State for similar reasons to those advanced against early planting. However, varieties with H.P. strain may, if the canes are sufficiently ripened, be shortened during March or April to from 3 to 5 ft. from the ground—the weaker the shorter. This will ensure a wealth of bloom in the late Autumn. For the annual overhaul the end of July and August is the best time. Hard pruning as practised in cold countries must not be generally applied here. The reason is not far to seek as the periods of inactivity are short and uncertain. Make the prevailing conditions your guide as to how and when to prune. Assist the pruning problem by observing the following golden rules during the entire season:—(1) Cut away dead, spindled wood; (2) Always cut blooms and stems that have bloomed well back to a strong eye; (3) Never allow seed pods to form on the bush. By these means you will encourage correct growth and freedom of bloom. There are odd varieties which resent the knife.

It is most important that plants be kept free from scale and other diseases, otherwise valuable portions have to be prematurely removed to the detriment of the plant. Exhibitors should prune harder than those growing for general purposes. Tea roses require lighter treatment than H.T.'s and H.P.'s.

To prune, cut away all dead, diseased, and spindling wood; thin out anything that is liable to crowd; cut back shoots to a strong eye, pointing outward in the case of uprights and inward on those of spreading habits; preserve any new, strong shoots coming from the base (often misnamed water shoots) that may serve to replace any worn out stems that should be renewed every three years or so.

As soon as the new growth appears, carefully rub off any shoot that is likely to overcrowd or grow in a wrong direction.

Climbers should be allowed their fling during the time they are establishing themselves. Train the strongest canes horizontally, about 18 in. apart, shorten the ends, and cut away all other wood. Provide for the renewal of these trailers every couple of years or so.

Aphis.—Nicotine sprays, such as Black Leaf Forty, are most effective. They may be kept in check by applying the hose freely.

Scale.—Spray with either red oil, kerosene, emulsion, or any lime-sulphur mixture. Many roses are lost annually through scale.

Grubs, &c.—For all leaf, plant, and flower-eating insects, spray with arsenate of lead as directed.

Mildew.—This is a stubborn fungus disease that has for many years past baffled our scientists. The rose, like all other life, no doubt requires a properly balanced food, and as analyses show that our soils are often deficient in potash and lime, it is not altogether surprising to find that, where good dressings of wood ashes have been applied, appreciable improvement in reducing the mildew scourge is apparent. Experiments are being conducted all over the world in search of a cure for mildew, and reports to hand show that potash used in its various forms gives results which are at least reassuring. For our part we can say that we have found the use of wood ashes, also spent carbide, beneficial. If these are not available, try giving each established tree say 4 to 6 oz. of sulphate of potash, in addition to lime, and observe the result.

Regular sprayings with liver of sulphur (1 oz. to 2 gallons of water), or 1 oz. bicarbonate of soda to 1 gallon of water, or Bordeaux, will ward off attacks. Remedies: Flowers of sulphur 9 parts, arsenate of lead 1 part, well mixed, applied with a bellows when the dew is on the foliage. Sprays: Sulphuric acid 1 part to 800 parts of rain water,. One ounce bicarbonate of soda to 1 gallon of rain water is a helpful spray. A drastic remedy is 2 tablespoonfuls Lysol to 1 gallon of water. Sprayings should be done before noon. Always treat the underneath as well as the top of the foliage.

Failures are generally attributable to one or more of the following causes:—

Having used fresh manures or fertiliser at time of planting; allowing roots to be exposed after unwrapping; lack of drainage or planting in soggy ground through excessive wet weather; planting too near the edge of raised beds, too near shrubs, trees, and/or hedges, also in shady positions; allowing plants to dry out after westerlies; giving too much water during first fourteen days; heavy frosts just after planting or even when the plant is established; planting too deep, planting too shallow, or planting too loose; acidity in damp or poorly prepared soils; chemical reactions from fertilisers previously applied to the soil; plants being knocked by children or the thoughtless gardener; dogs and cats are often the cause of plants dying or being damaged; the use of strong soap suds, &c.; planting too early or too late; planting in same spot where a rose has been growing unless soil has been replaced.

FLOWER GARDEN.

Winter work ought to be in an advanced state. The roses will not want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, cockscombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna lily, and other bulbs. Put away dahlia roots in some warm moist spot, where they will start gently and be ready for planting out in August and September.

THE CARE OF THE LAWN.

For a lawn to be a success it must be carefully made in the first place. Good drainage is essential, for stagnant water-logged soil encourages weeds and kills the grass. The soil should be rich in plant food. Give the ground a heavy dressing of good manure, and thoroughly dig it over. Enough time should then be allowed for the soil to settle, as it must be firm when the grass is planted or there will be a series of hills and hollows shortly after. In addition to the manure apply the following mixture at the rate of 3 oz. to the square yard, forking or raking it well into the top spit of the soil:—2 lb. superphosphate of lime, 1 lb. bonemeal, and 1 lb. sulphate of ammonia.

Early in the spring, as the grass begins to grow, a heavy roller should be passed several times over the ground.

Lawns showing bare patches will require a dressing during the autumn, and the mixture previously mentioned will be found very suitable, and will keep the grass well nourished. Wood ashes and soot, combined or not, will also be found beneficial. All dressings should be applied during showery weather. If soil poverty is the cause of a patchy lawn, it is best to rake over in the autumn with a sharp-toothed rake, and dress with a good layer of fine soil and wood ashes.

Orchard Notes for July.

THE COASTAL DISTRICTS.

The marketing of citrus fruits will continue to occupy the attention of growers. The same care in the handling, grading, and packing of the fruit that has been so strongly insisted upon in these monthly notes must be continued if satisfactory returns are to be expected. Despite the advice that has been given over and over again, some growers still fail to grasp the importance of placing their fruit on the market in the best possible condition, and persist in marketing it ungraded; good, blemished, and inferior fruit being met with in the same case. This, to say the least, is very bad business, and as some growers will not take the necessary trouble to grade and pack properly, there is only one thing to do, and that is to insist on the observance of standards of quality and see that the fruit offered for sale complies with the standards prescribed, and that cases are marked accordingly.

Where the crop has been gathered, the trees may be given such winter pruning as may be necessary, such as the removal of broken or diseased limbs or branches, and the pruning of any superfluous wood from the centre of the tree. Where gumming of any kind is seen it should be at once attended to. If at the collar of the tree and attacking the main roots, the earth should be removed from around the trunk and main roots—all diseased wood, bark, and roots should be cut away, and the whole of the exposed parts painted with Bordeaux paste.

When treated do not fill in the soil around the main roots, but allow them to be exposed to the air for some time, as this tends to check any further gumming. When the gum is on the trunk or main limbs of the tree cut away all diseased bark and wood till a healthy growth is met with, and cover the wounds with Bordeaux paste.

If the main limbs are infested with scale insects or attacked by any kind of moss, lichen, or fungus growth, they should be sprayed with lime sulphur.

Towards the end of the month all young trees should be carefully examined for the presence of elephant beetles, which, in addition to eating the leaves and young bark, lay their eggs in the fork of the tree. When the young hatch out they eat their way through to the wood and then work between the wood and the bark, eventually ringbarking one or more of the main limbs, or even the trunk. A dressing of strong lime sulphur to the trunk and fork of the tree, if applied before the beetles lay their eggs, will act as a preventive. In the warmer localities a careful watch should also be kept for the first appearance of any sucking bugs, and to destroy any that may be found. If this is done systematically by all growers the damage done by this pest will be very much reduced.

Citrus trees may be planted throughout the month. Take care to see that the work is done in accordance with the instructions given in the June notes. All worn-out trees should be taken out, provided the root system is too far gone to be renovated, but when the root system is still good the top of the tree should be removed till sound, healthy wood is met with, and the portion left should be painted with a strong solution of lime sulphur. If this is done the tree will make a clean, healthy growth in spring.

The inclusion of a wide range of varieties in citrus orchards—and which has been the general practice—is to be deprecated. Even in new plantations there is a tendency to follow the same unprofitable lines. Far too much consideration is given to the vendor's description or the purchaser's appreciation of a particular variety or varieties. Individual tastes must be subordinated to market requirements, and the selection of varieties to the best available kind of early, medium, and late fruits. Amongst oranges Joppa should be placed first, Sabina for early fruit, and Valencia or Loon Giru Gong for late markets.

In mandarins local conditions influence several varieties, and since the introduction of the fungus known as "scab" the inclusion, particularly on volcanic soil, of the Glen Retreat and Emperor types is risky. In alluvial lands, Emperor and Sovereign (an improved Glen Retreat) are the most profitable, though Scarlet in many places is worth including, with King of Siam as a late fruit.

Land intended for bananas and pineapples may be got ready, and existing plantations should be kept in a well-cultivated condition so as to retain moisture in the soil.

Bananas intended for Southern markets may be allowed to become fully developed, but not coloured, as they carry well during the colder months of the year, unless they meet with a very cold spell when passing through the New England district of New South Wales.

The winter crop of smoothleaf pines will commence to ripen towards the end of the month, and when free from blackheart (the result of a cold winter) or from fruitlet core rot, they are good for canning, as they are of firm texture and stand handling. Where there is any danger of frost or even of cold winds, it pays to cover pines and also the bunches of bananas. Bush hay is used for the former and sacking for the latter.

Strawberries should be plentiful during the month, provided the weather is suitable to their development, but if there is an insufficient rainfall, then irrigation is required to produce a crop. Strawberries, like all other fruits, pay well for careful handling, grading, and packing; well-packed boxes always realising a much higher price than indifferently packed ones on the local market. Where strawberries show signs of leaf blight or mildew, spray with Bordeaux mixture for the former and with sulphide of soda for the latter.

When custard apples fail to ripen when gathered, try the effect of placing them in the banana-ripening rooms, and they will soon soften instead of turning black.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

July is a busy month for the growers of deciduous fruits, as the important work of winter pruning should, if possible, be completed before the end of the month, so as to give plenty of time for spraying and getting the orchard into proper trim before the spring growth starts.

In pruning, follow the advice given in the May number; and if you are not thoroughly conversant with the work, get the advice of one of the Departmental officers stationed in the district.

Pruning is one of the most important orchard operations, as the following and succeeding seasons' crops depend very largely on the manner in which it is carried out. It regulates the growth as well as the number and size of the fruit, as if too much bearing wood is left, there is a chance of the tree setting many more fruits than it can properly mature, with a result that unless it is rigorously thinned out it is undersized and unsaleable. On the other hand, it is not advisable to unduly reduce the quantity of bearing wood, or a small crop of overgrown fruit may be the result.

Apples, pears, and European varieties of plums produce their fruits on spurs that are formed on wood of two-years' growth or more; apricots and Japanese plums on new growth and on spurs; but peaches and nectarines always on wood of the previous season's growth. Once peachwood has fruited it will not produce any more from the same season's wood, though it may develop spurs having a new growth or new laterals which will produce fruit.

The pruning of the peaches and nectarines, therefore, necessitates the leaving of sufficient new wood on the tree each season to carry a full crop, as well as the leaving of buds from which to grow new wood for the succeeding year's crop. In other words, one not only prunes for the immediately succeeding crop, but also for that of the following season.

All prunings should be gathered and burnt, as any disease that may be on the wood is thoroughly destroyed. When pruned, the trees are ready for their winter spraying with lime-sulphur.

All kinds of deciduous trees may be planted during the month provided the ground is in a proper state to plant them. If not, it is better to delay planting until August, and carry out the necessary work in the interval. The preparation of new land for planting may be continued, although it is somewhat late in the season, as new land is always the better for being given a chance to mellow and sweeten before being planted. Do not prune vines yet on the Granite Belt; they can, however, be pruned on the Downs and in the western districts.

Trees of all kinds, including citrus, can also be planted in suitable situations on the Downs and western districts, and the pruning of deciduous trees should be concluded there. If the winter has been very dry, and the soil is badly in need of moisture, all orchards in the western districts, after being pruned and ploughed, should receive a thorough irrigation (where water is available) about the end of the month, so as to provide moisture for the use of the trees when they start growth. Irrigation should be followed by a thorough cultivation of the land to conserve the water so applied. As frequently mentioned in these notes, irrigation and cultivation must go hand in hand if the best results are to be obtained, especially in our hot and dry districts.

Farm Notes for July.

FIELD.—Practically the whole of the work on the land for this month will be confined to the cultivation of winter crops, which should be now making good growth, and to the preparation of land for the large variety of crops which can be sown next month. Early-maturing varieties of wheat may be sown this month. The harvesting of late-sown maize will be nearing completion, and all old stalks should be ploughed in and allowed to rot. Clean up all headlands of weeds and rubbish, and for this purpose nothing equals a good fire. Mangels, swedes, and other root crops should be now well away, and should be ready for thinning out. Frosts, which can be expected almost for a certainty this month, will do much towards ridding the land of insect pests and checking weed growth. Cotton-picking should be now practically finished and the land under preparation for the next crop. The young lucerne should be becoming well established; the first cutting should be made before the plants flower—in fact, as soon as they are strong enough to stand the mowing machine—and the cutting of subsequent crops should be as frequent as the growth and development of the lucerne plants permit. Ordinarily cutting should be regulated to fit in with the early-flowering period—i.e., when about one-third of the plants in the crop are in flower.

SUBSCRIPTIONS TO THE JOURNAL.

Subscribers are reminded that when a cross is placed in the square on the first page of the Journal it is an indication that the term of their subscription ends with the number so marked, and that it is advisable to renew immediately if they desire the retention of their names on our mailing list.

To farmers, graziers, horticulturists, and Schools of Art the annual subscription—one shilling—is merely nominal, and the charge is only imposed to cover the cost of postage. To them, otherwise, it is an absolutely free issue. Members of agricultural and similar societies who are not actively engaged in land pursuits are asked to pay five shillings a year, while the annual subscription charged to the general public is ten shillings.

Farmers particularly are urged to keep their names on our mailing list, for through the Journal they may keep themselves well informed in respect to the activities of the Department, and other matters with which they are directly concerned. Instead of sending just the annual subscription along it is suggested that, when renewing it, they do so for a longer term. For instance, five shillings would keep their names on our subscribers' register for five years. By doing this they would obviously help to reduce clerical labour as well as avoid the inconvenience to themselves of posting annually the very small sum necessary to keep their names on our mailing list.

On another page an order form may be found, and for those whose annual subscription is about due what is wrong with filling it up now and posting it direct to the Under Secretary, Department of Agriculture and Stock?

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	June, 1930.		July, 1930.		MOONRISE. June. 1930.	MOONRISE. July, 1930.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.39	5.2	6.46	5.5	a.m. 10.29	a.m. 10.36
2	6.39	5.2	6.46	5.5	11.19	11.9
3	6.40	5.2	6.46	5.5	11.59	11.43
4	6.40	5.1	6.46	5.6	p.m. 12.36	p.m. 12 15
5	6.41	5.1	6.46	5.6	1.8	12 49
6	6.41	5.1	6.46	5.7	1.40	1.22
7	6.42	5.1	6.46	5.7	2.12	2.1
8	6.42	5.0	6.46	5.8	2.46	2.47
9	6.42	5.0	6.45	5 8	3.21	3 36
10	6.43	5.0	6.45	5.8	4.3	4.28
11	6.43	5.0	6.45	5.9	4.51	5.24
12	6.43	5.0	6.45	5.9	5.52	6.18
13	6.43	5.0	6.45	5.9	6.35	7.11
14	6.44	5.0	6.45	5.10	7.30	8.7
15	6.44	5.0	6.45	5.10	8.25	9.0
16	6.44	5.0	6.45	5.11	9.20	9.53
17	6.44	5.1	6.44	5.11	10.15	10.46
18	6.45	5.1	6 44	5.12	11.9	11.39
19	6.45	5.1	6.44	5.12	...	...
20	6.45	5.1	6.43	5.13	a.m. 12.1	a.m. 12.38
21	6.45	5.2	6.43	5.13	12.55	1.37
22	6.46	5.2	6.43	5.14	1.47	2.43
23	6.46	5.2	6.42	5.14	2.51	3.47
24	6.46	5.2	6.42	5.14	3.56	4.54
25	6.46	5.3	6.41	5.15	5.1	5.58
26	6.46	5.3	6.41	5.15	6.9	6.58
27	6.47	5.3	6.40	5.16	7.16	7.48
28	6.47	5.3	6.40	5.16	8.17	8.30
29	6.47	5.3	6.39	5.17	9.13	9.7
30	6.47	5.3	6.39	5.17	9.55	9.40
31	...	...	6.38	5.18	...	10.15

Phases of the Moon, Occultations, &c.

4 June	☾ First Quarter	7 56	a.m.
11 ,,	○ Full Moon	4 12	p.m.
19 ,,	☽ Last Quarter	7 0	p.m.
26 ,,	● New Moon	11 47	p.m.

Apogee, 16th June, at 10.54 a.m.
Perigee, 28th June, at 1.18 p.m.

The planet Uranus will be occulted by the Moon in the early morning of 21st June, when both are high up in the north-north-east. The disappearance will take place between 4 and 5 a.m., the exact time varying according to the position of the observer.

Particular notice should be taken of the places on the horizon where the Sun rises and sets on the 20th, 21st, 22nd, and 23rd; it will be 23 degrees 26 minutes north of the east and west points, and mark our winter Solstice.

The Southern Cross will reach the meridian and be erect about 8 p.m. at the beginning of the month and about 6 p.m. at the end. It will then be 61 degrees 20 minutes, at Warwick, from the true horizon to the top star of the Cross. When at this position the part of the Great Bear known as the plough will be on our northern horizon and clearly seen, especially from places in the northern part of Queensland.

Mercury will rise at 5.18 a.m. on the 1st and at 4.55 a.m. on the 15th.

Venus will set at 7 p.m. on the 1st and at 7.19 p.m. on the 15th.

Mars will rise at 3.26 a.m. on the 1st and at 3.19 a.m. on the 15th.

Jupiter will set at 6 p.m. on the 1st and at 5.17 p.m. on the 15th.

Saturn will rise at 7.10 p.m. on the 1st and at 6.11 p.m. on the 15th.

3 July	☾ First Quarter	2 3	p.m.
11 ,,	○ Full Moon	6 1	a.m.
19 ,,	☽ Last Quarter	9 29	a.m.
26 ,,	● New Moon	6 41	a.m.

Apogee, 13th July, at 11.36 p.m.
Perigee, 26th July, at 8.6 p.m.

On the 3rd the Earth will be in that part of its orbit which widens out from the Sun to a distance of 94,450,000 miles, or 1,560,000 miles more than its mean distance.

On the 5th Mercury will pass from the west to the east of Jupiter, and on the 15th it will pass the Sun.

The Moon will pass from west to east of Saturn on the 10th at 10 a.m. At 10 p.m. it will be interesting to notice that a distance of 7 degrees, or rather more than the length of the Southern Cross, will separate the two objects, which will be remarkably near the zenith at Brisbane, Toowoomba, and Warwick. On such occasions it is difficult to find any shadow to a telegraph pole.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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